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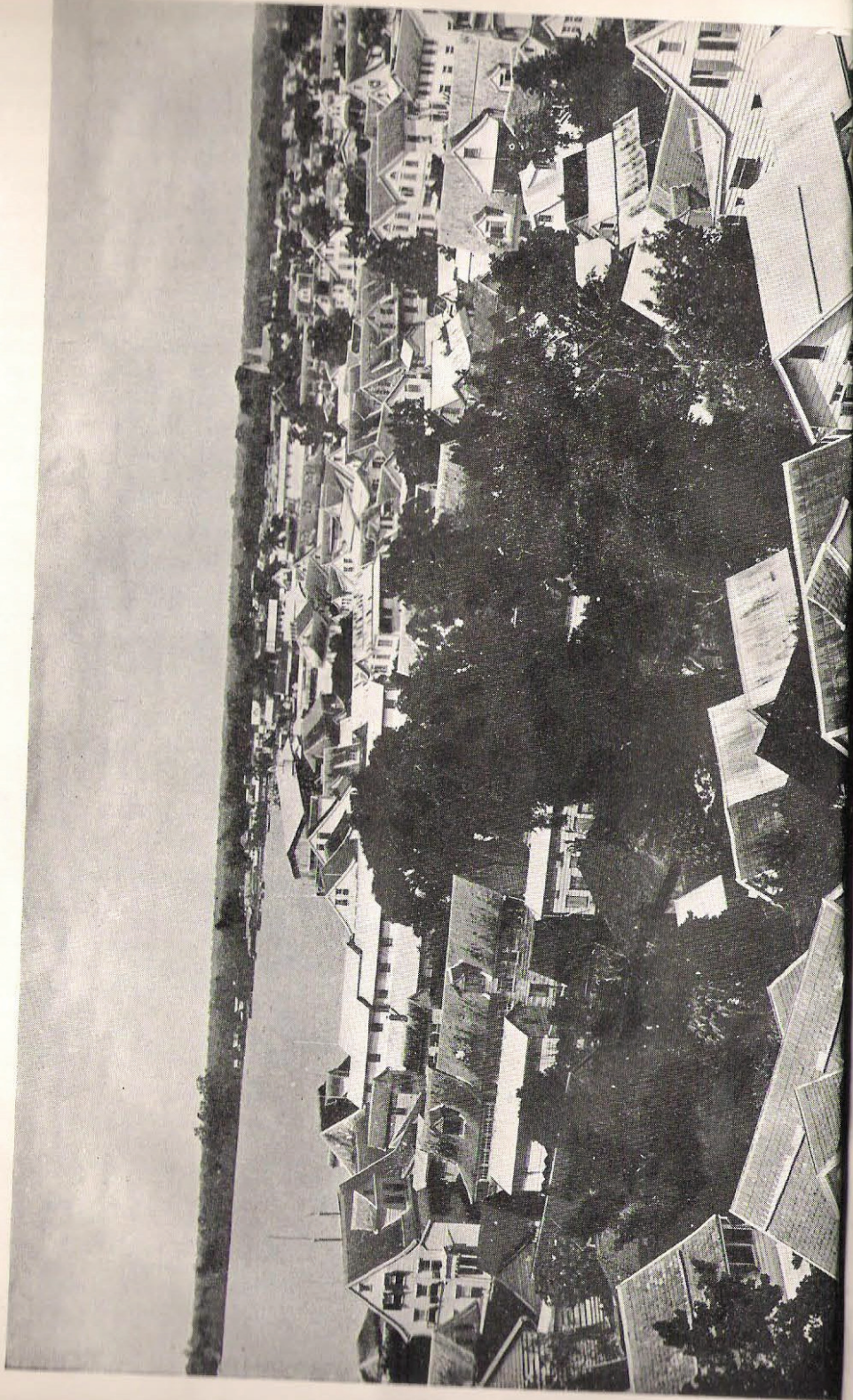
A GEOGRAPHIC STUDY

BY

J. WARREN NYSTROM

THE NETHERLANDS INFORMATION BUREAU
10 ROCKEFELLER PLAZA
NEW YORK CITY

SURINAM—A GEOGRAPHIC STUDY



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Surinam—A Geographic Study

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CREOLE GIRL, SURINAM
After an oil painting by Clara Klinghoffer

SURINAM

A GEOGRAPHIC STUDY

by

J. WARREN NYSTROM

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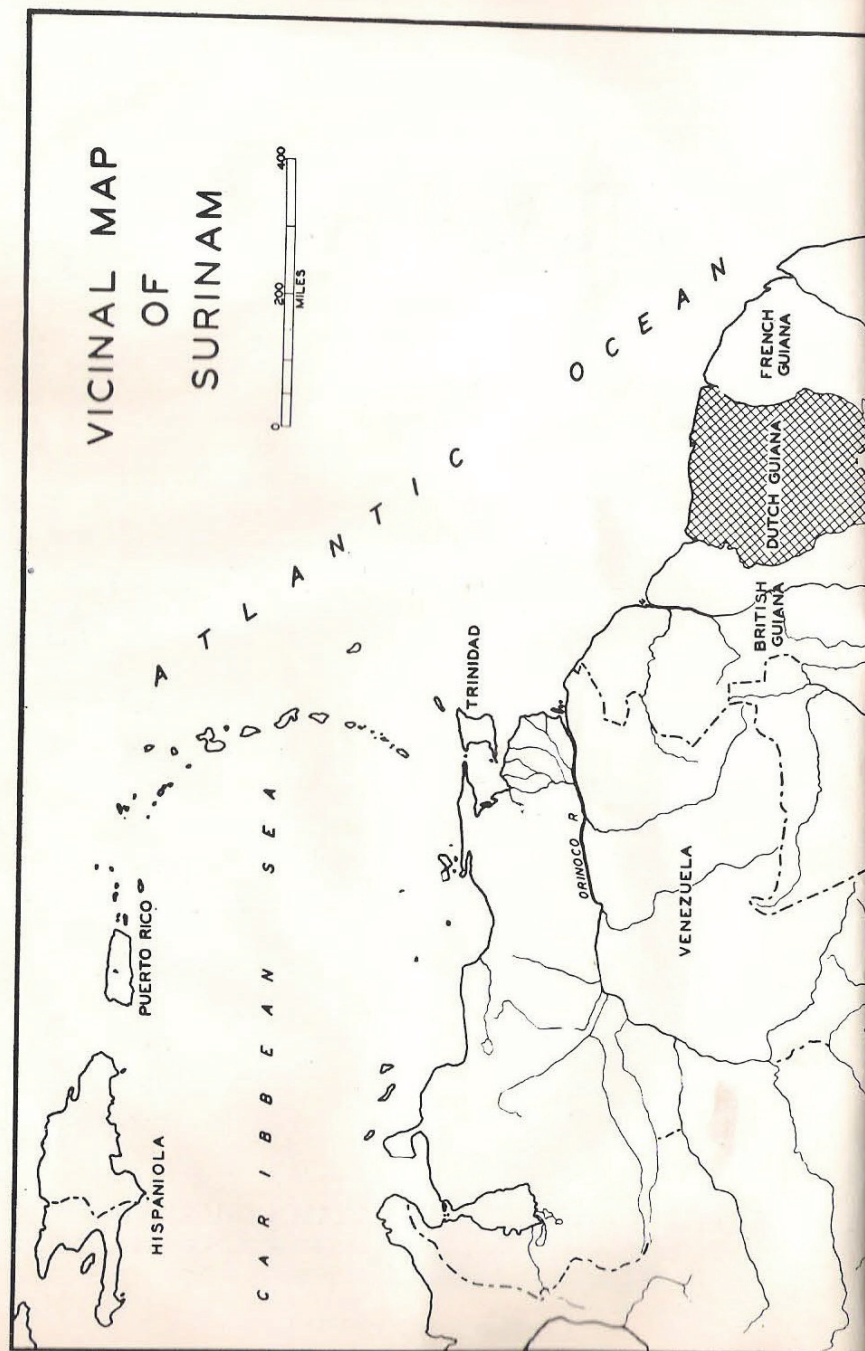
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CHAPTER I

The Region and the Problem

Surinam, or Dutch Guiana, the only possession of Holland in continental South America, has assumed especial importance since the beginning of World War II. This tropical land on the north-eastern bulge of South America has suddenly received universal publicity because of its strategic location and its valuable mineral resource, bauxite.

Surinam forms a part of Guiana, the territory between the two mighty rivers of South America, the Amazon and the Orinoco. This area is divided into Brazilian, French, Dutch, British, and Venezuelan Guiana, and Surinam lies sandwiched between the French and British colonies. (See map I.) The Marowyne River is the boundary on the east at the French frontier, and the Corantyne River serves a similar function on the west. The Tumuc-Humac Mountain chain, forming the divide of the Amazon River system, and the Atlantic Ocean mark the southern and northern boundaries respectively. Surinam extends from 2 to 6 degrees North Latitude, and from 54 to 58 degrees West Longitude. Its area of 54,300 square miles is about four times that of the mother country, and approximately the same as that of the state of Wisconsin.

Physically, the land may be roughly divided into three main zones running parallel to the coast: (1) a narrow fluvial marine coastal plain approximately ten miles wide at the Marowyne River and widening gradually to 50 miles at the Corantyne; (2) in the second zone, a belt of about 30 to 40 miles wide, scattered savannas break up the dominant equatorial forest growth; (3) the third zone contains the hilly and mountainous interior which composes the greater part of the country but which is little known and of very slight economic importance.

(1) The low coastal plain rises gradually from the sea level,

and the line of demarcation between land and sea is not sharp. A great deal of this area is below the level of high tide so diking has become necessary in order to utilize the land. As seen from the air, the shifting coastline, fringed by a curtain of muddy water, gives a dismal impression; mangrove trees and swamps dominating the landscape indicate the poverty of the area. Low sand ridges, "schelpritsen," running parallel to the coast, furnish better drainage, and here the population centers, both past and present, have developed, such as Paramaribo the capital, and Coronie. The low land between the ridges often forms swamps. Dutch colonists, using to good advantage their experience of fighting the sea, have built dykes at the mouths of the Suriname, Commewyne, Saramacca, and Nickerie Rivers. At these points, the agricultural industry of Surinam is concentrated, because of a fairly fertile and heavy soil. Here are the only practical spots of cultivation in the entire land of nearly unbroken forest.

(2) The "savanna" belt is unfortunately named, because it offers a false impression. To be sure, savanna vegetation may be observed in the area, not in an uninterrupted stand but rather in small scattered places. This savanna vegetation is due largely to edaphic rather than climatic conditions, and the soil in this region consists of quartz sand and loam. The agricultural possibilities of the belt are slight, and although governmental experiments have been made with various types of crops, palm oil, etc., no great success has been reported.

(3) The vast hilly interior country, rising slowly in elevation to the highest peak in the Wilhelmina Mountains (4,120 ft.), is sparsely inhabited by Bush Negroes and American Indians, the Caribs and the Arawaks, whose chief occupations are logging and balata bleeding. These primitive people settle along the arteries of transportation, leaving uninhabited the tropical rain forest which covers the greater portions of the land.

The climate of Surinam, due to its location in the low latitudes, is tropical, offering temperatures which are high throughout the year with very small seasonal changes. In Paramaribo, the range

Twelve

between the warmest and the coolest month is less than three degrees Fahrenheit. Temperatures in the coastal belt are usually one to two degrees cooler than in the interior because of the moderating influences of the sea breezes. Characteristic of this climate is the heavy rainfall; Paramaribo has a mean precipitation of 91 inches. Surinam's driest areas lie in the western coastal district around Nickerie while the rainiest are in the interior. Fortunately, Surinam lies outside the hurricane zone, and thus escapes the serious wind damages of the lands to the north in the Caribbean. Someone has described the climate of this South American Dutch Territory as a cross between a Finnish steam bath and an orchid hothouse, but in reality, the moist tropical conditions are not unbearable, and records show that the health status is very good for the Whites as well as the Negroes, Asiatics, and Indians. A very favorable fact is the low death rate which is only 11.2 per cent per thousand, no higher than that of the United States.

Traders from the Netherlands first sailed along the coast of Guiana before 1600. Their first settlement was made in 1621, in what is now British Guiana, and successfully held by them until the eighteenth century. Surinam itself was first settled by Great Britain in 1630 and controlled by her during most of the Napoleonic era when it was restored to the Dutch in 1815. In the year 1667, the Breda Peace Treaty ended the Anglo-Dutch War. In this treaty, the Dutch traded the colony of New Amsterdam (New York) for the Guianas, including the present French and British Guianas and a part of Brazil. The reason for the exchange was the lure of the very profitable plantations of tobacco and sugar, and the rumors of vast riches of gold to be found elsewhere in the country. This El Dorado and the apparent wealth of the tropical crops were too much to resist. However, the gold and sugar paradise never flourished to any great extent and slowly declined in the nineteenth and twentieth centuries. The colony has been a consistent liability to the mother country, but the present government under Governor Dr. J. C. Kielstra has been planning for a more prosperous future.

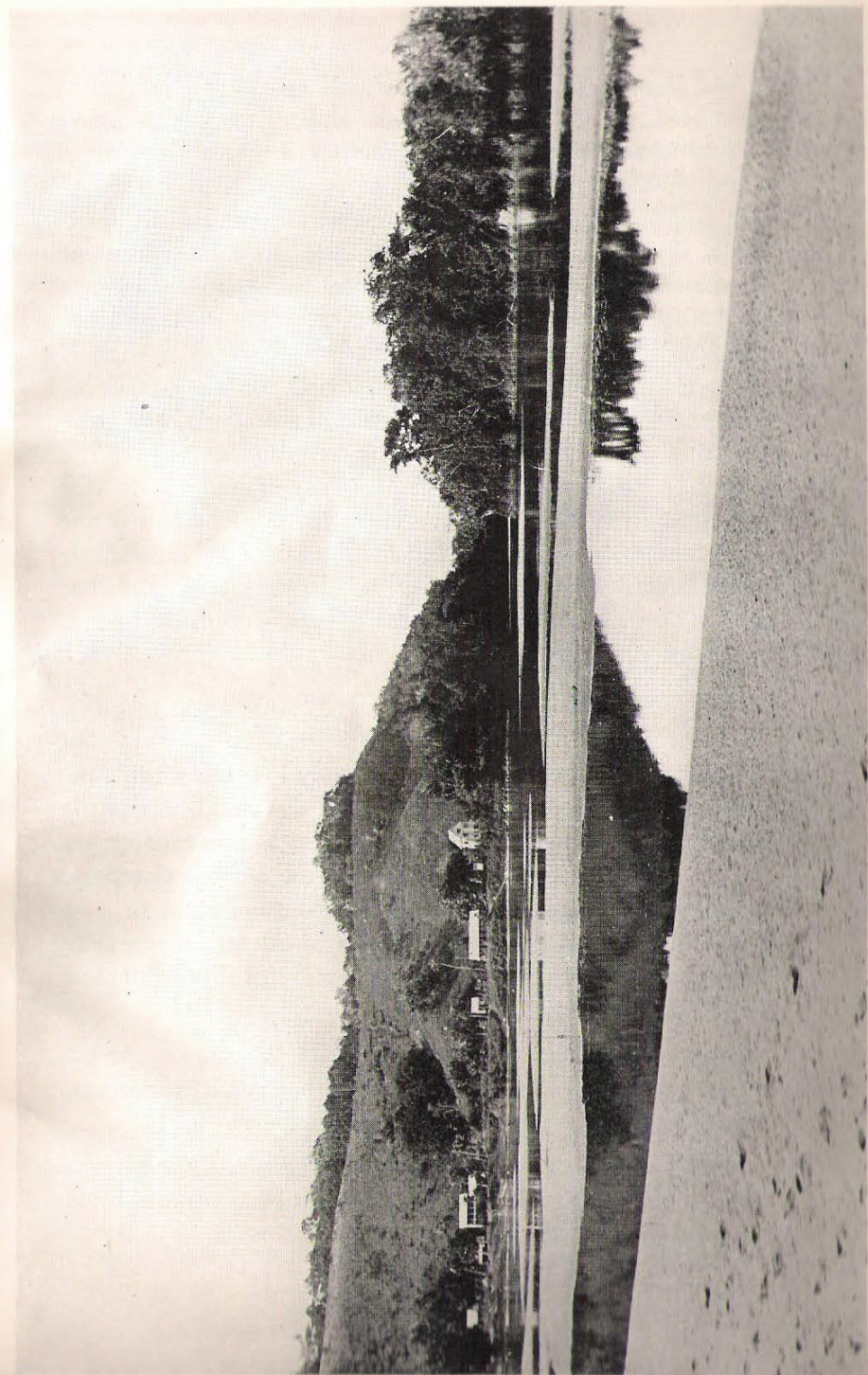
Thirteen

Because it had practically no indigenous labor supply, Surinam had to depend upon importing Negro slaves from Africa during early colonization. In 1819,¹ the slave trade was abolished, and in 1863 slavery itself was ended. This presented a very difficult problem of labor in the colony whose population then was 53,000 of which 35,000 were slaves. The emancipated Negroes left the plantations to settle in the towns, chiefly in Paramaribo, and these constitute what is known as the Creole element. Others went to the interior to live the primitive life of the Bush people, and are known as Djukas: Surinam and Sarramacca tribes. It was, therefore, necessary to import a supplementary labor supply, and after 1865, at various times, Chinese, British Indians, and Javanese were brought into Surinam to relieve the problem. The best results were obtained by contracting workers from the latter two groups. The total population of Surinam in 1941 was 178,000; of this the Creole element made up 40 per cent; British Indians, 25 per cent; Javanese, 20 per cent; Bush Negroes, 10 per cent; Whites, 2 per cent; Indians, 2 per cent; and Chinese, 1 per cent.

Ruling over this extremely cosmopolitan population that may be called an anthropologist's dream, is the small group of White people. Dutch officials and businessmen, with excellent training and reputation in colonial administration have not succeeded in making Surinam an asset to the Empire of the Netherlands. This is not due to any inefficiency on their part, but rather because of the poverty of geographical resources and poor transportation. Thus, for decades, Surinam has not been a paying proposition.

The bulk of Dutch Guiana's population is engaged in farming. Agriculturally, the colony is a land of samples. Cultivated areas, confined largely to the coastal fluvial-marine belt, total 150 square miles, one-third of which is in large plantations, and the rest in small holdings. A potential cultivable area, ten times this size, would be possible if an extensive and expensive polder-building program were attempted.

¹ In 1808 the English abolished this trade. It was re-admitted in 1815 until the final prohibition in 1819. Ed. Note.



The shifts and changes in Surinam's agricultural production have been many. The early colonial crop of tobacco soon gave way to sugar which reigned supreme for centuries but declined in the nineteenth and twentieth centuries. Cotton, another important crop in the seventeenth and eighteenth centuries, has practically disappeared; cacao, which reached great heights in the nineteenth century, has died; the same dismal story applies to the banana production which failed in 1911. In the last decade the introduction of the Congo banana revived the industry somewhat, but no market has yet been found for the production. Coffee, at the present time, is at the end of a similar vicious cycle, and most of the plantations are now reverting to jungle. The only crop which brightens the discouraging outlook is that of rice which is doing very well under the skillful hands of the small farmers, mostly British Indians and Javanese. Experiments in mechanical rice production by Whites have been tried, but there is little to indicate that this can compete with native farmers in the wet, heavy clay lowlands.

Experiments have been undertaken with oranges. The preliminary results were not discouraging.

Bauxite, the chief product of the country today, is steadily becoming more important to Surinam and the world. Mining is carried on at Moengo on the Cottica River and at Paranam on the Surinam River. A Dutch concern, the Billiton Company, located on the Surinam River next to Paranam, plans to start production soon and offer competition to Alcoa. The bauxite deposits of Surinam lie close to the surface so that the ore is mined by the open-pit method.

Gold is found chiefly in the riverbeds of the interior. At the present time, it is of little importance, although it remains, next to bauxite, the most valuable export of the colony.

The trade of Surinam in the last few years has become more favorably balanced and is dominated by bauxite which is being shipped entirely to the United States.

CHAPTER II

Historical Geography

Guiana was discovered early in the colonial period because of its favorable location in respect to the Northeast trade winds blowing from Europe. The land was first seen by Columbus in 1499, but no settlement was made for more than a century afterwards due partly to a fear of the Carib and the Arawak Indians. These natives are described vividly by an early writer on Surinam as: "a People cowardly and treacherous, qualities unseparable. Their arms are bows, with poisonal arrows, and short-clubs of speckle wood. They observe no order in their fighting, nor unless upon very great advantages, enterprise anything but by night. The men they take prisoners, they put to Death with most barbarous cruelties a Coward can invent for an enemy in his power. Women and children they preserve for slaves, and sell them for trifles to the English."¹ Such opposition by the natives would certainly discourage any settlement by white people. The absence of gold discoveries in the early days naturally influenced the Spanish and Portuguese adventurers to prospect elsewhere.

The traders from the Netherlands began to take an interest in the Guianas in the year 1620, and what is now British Guiana was settled by the Dutch in 1621. However, the first colonization of Surinam proper was made by the British in 1630 under the direction of a Captain Marshall, attempting the cultivation of tobacco. This small settlement evidently did not thrive, because the French later claim the distinction of having established the original colony in 1640. The country proved to be unhealthy for the French, and they abandoned it "with so much the less regret,

¹ "Impartial Description of Surinam," by George Warren, published in 1667.

as grubbing up the land cost them much pains, and they were continually exposed to the insults of the native Indians."¹

Lord Willoughby in 1650 made an alliance with the Indians, and an English colony was established, the population of which was increased in 1654 by the addition of French driven from Cayenne by the Indians. Because of the lack of good native labor supply, Negro slaves were introduced with the occupation of the territory. By 1665 the population had amounted to nearly 4,000 inhabitants with 40 to 50 plantations being operated. The ruling power then consisted of a governor and his council, submitting to the general laws of England.

Surinam did not continue under the British flag for very long, because in 1665 the Anglo-Dutch War began, and in February of 1667 the Dutch conquered the colony. Admiral Crynssen, commanding a fleet from Zeeland, sailed up the Surinam River to Paramaribo and forced the English under William Byan to capitulate. The terms offered by the Dutch to the planters were the privilege of their property while taking the oath of allegiance to the Netherlands. However, all the effects of Governor Willoughby of Parham and the absent English were confiscated.

In the European War theatre, the Dutch Admiral De Ruyter boldly sailed up the Thames River and burned the British Royal Navy at Chatham, and this feat of arms led to the signing of the peace treaty at Breda in July, 1667.

During the war, the Dutch had been expelled from Nieuw Amsterdam (New York), and this region was then ceded to England. Surinam, conquered by the Dutch, became a colony of the Netherlands, because by an article of the Treaty, both nations were to keep whatever they had conquered from each other during the strife.

The Dutch were elated with the exchange in colonies. Nieuw Amsterdam was an ordinary temperate land while Surinam was

¹ "History of Surinam," by Phillippe Fermin, published 1781. Page 12.

² Ibid. Page 13.

a tropical paradise. Surinam was called "beyond comparison the richest and most valuable colony belonging to the United Provinces, owing to the vast treasures it continually pours into the scale of commerce."¹

The result of the two Anglo-Dutch wars in 1665-1667, and 1672-1674, was to leave Surinam temporarily in a very bad situation due to a general withdrawal in 1674 of English settlers with their slaves and property. A number of Jewish inhabitants under the leadership of David Nassy aided conditions greatly. These Jews, driven out of Brazil and Cayenne, had settled up the Surinam River at the Jewish savanna, and they added an energetic and enterprising element to the colony.

Indians still were a menace, and in 1679 Heinsius, the Governor, requested assistance against the natives who were ravaging the land. Some aid was granted, but sound government and the maintenance of law and order were not established until Sommelsdijk became the Governor in 1683. During the five years of his energetic rule, he achieved results which entitle him to be regarded as the real founder of the colony.² It was he who succeeded in bringing a bankrupt and disorganized settlement into a more prosperous and ordered state. However, this reform governor aroused much antagonism because of his high-handed methods. Sommelsdijk was instrumental in gaining the good will of the Indians, and he also forbade many cruelties inflicted upon the Negro slaves. He established a Court of Justice which punished all offenders of the law, and he protected the Nassy center at the Jewish Savanna which became the most prosperous site of the colony. When he arrived at Paramaribo, he found the soldiers idle and undisciplined. Immediately, he set them to work in digging the Sommelsdijk Canal, now called the Sarramacca Canal, connecting the Surinam and Sarramacca Rivers. When Sommelsdijk came to this South American Dutch country, there were only 50 plantations, many of them ruined. In five years there were

¹ Phillippe Fermin, *op. cit.* Page 9.

² "Historical Section," British Foreign Office, published 1920. Dutch Guiana, Page 11.

more than 200 of these estates flourishing. The governor also introduced the cultivation of cacao.¹ This vigorous administration created enemies, and in 1688 Sommelsdijk was murdered by mutinous soldiers.

The following administrations were carried on successfully upon the foundations laid down by Sommelsdijk. French privateers were to cause much distress in the ill-protected settlement. In 1689, the French Corsair, Du Casse, attacked the fortress at Paramaribo, but the Dutch drove back the invaders. Surinam was not so fortunate in 1712 when another French privateer, de Cassard, pillaged many of the plantations, and the Dutch were forced to yield because of poor preparation of troops and fortifications. A heavy ransom was obtained, and de Cassard sailed away leaving the Dutch with a new and difficult problem.

Negro slaves, badly treated, had for many years escaped to the "Big Bush" and settled in Negro villages there. The de Cassard invasion enabled large numbers of Negroes to leave their work and join their fellowmen in the Bush. For the next sixty years, the history of Surinam consists of dangerous revolts of these black people and of expeditions sent against them. Cruel handling of the slaves gave ample grounds for them to desert the plantations and seek a happier life in the interior.

Naturally, the escaped slaves fought bitterly to maintain their freedom, and the nature of the terrain—swamps and dense forests—made their capture by the pursuing white people a difficult task. In 1730 there was a new revolt on the plantation known as "Berg-en-dal," and for many years after this the struggle between the blacks and whites continued. Most of the expeditions sent against the rebels were failures, but eventually the Bush Negroes were pacified, although not subdued. The tribes were acknowledged as practically free, and an arrangement was made for an annual salary paid by the Dutch government to tribal chiefs for maintaining order.

In spite of the many difficulties, the colony did make progress.

¹ "British Foreign Office," *op. cit.* Page 11.

J. Clifford states that "because of the richness of the soil, a planter in Surinam with 100 slaves, could make more sugar in one year than a planter in Barbados could do in three years with the same number of slaves. The colony from the year 1685 to 1695, with about 1,200 white people, and 6,000 slaves, made, from about a hundred plantations, 6,000 hogsheads of sugar a year."¹ By 1710, the population had increased to 1,500 Europeans and 10,000 slaves.

Other products besides sugar began to play important roles in Surinam economy. Because of the competition on the sugar market by neighboring producing areas, the culture of coffee was begun. Encouraged by high prices, the coffee yield increased rapidly in Surinam during the early seventeenth century, but declined later in the same century. Cacao was also cultivated with great success, and soon cotton became a member of the "Big Four" of Surinam agriculture.

In 1775 Surinam exported 15,200,000 pounds of sugar, 18,000 pounds of coffee, 600,000 pounds of cacao, and 160,000 pounds of cotton, besides other goods, and the total value was reckoned at 1,416,250 florins.² Surinam was regarded as an extremely valuable possession at this time, and Fermin states: "Colony of Surinam is without contradiction, the richest and of greatest value to Holland. It is distinguished from all the colonies of America by the abundance and qualities of its production; for the coffee, cocoa, cotton, and sugar which grow there exceed in goodness the like commodities of other places."³

However, Surinam was never to live up to the high expectations of the empire builders. Already in the 18th century, the colony began to decline in importance due to the large period of strife with the Negroes, poor administrations, faulty financial management, and loss of credit. By 1775, definite signs of weakness were evident, but the next century was to bring real tragedy. "Experi-

¹ "J. Clifford's Case," published in 1711. Page 30.

² "British Foreign Office," *op. cit.* Page 12.

³ Philippe Fermin, *op. cit.* Page 134.

ence shows thus that a people may be unfortunate in the midst of all the wealth of the world."¹

In 1780, Holland and Great Britain went to war again, and the British forces captured Demerara. The defenses of Surinam were strong enough to beat back the invaders. In the next three decades, the Napoleonic Wars of Europe influenced the history of Guiana. The important events of this great era were as follows:

1795—Conquest of Holland by France.

1799—British forces capture Surinam in the name of the Stadholder, William the Fifth.

1802—Peace of Amiens, Surinam restored to the Dutch.²

1803—Renewal of War and Surinam retaken by the British.

1815—Holland regains Surinam according to the Vienna Treaty.

The Dutch found Surinam of 1815 in a very unfortunate condition. The abolition of the slave trade in 1808 resulted in a labor shortage. For more than fifteen years, Surinam had been cut off from the mother country and from Europe, and the British were not interested in the Dutch colony. Consequently, trade had fallen off very abruptly, and by the end of the Napoleonic period, much capital was required to revive the country. At this time, Holland had neither the interest nor the necessary funds with which to settle such a problem. The focus of Dutch colonial aims lay in the East, not in the West; in Java, rather than in Surinam. Also since 1830 the Dutch had the Belgian problem to claim their immediate attention. Holland was in a difficult financial situation, and thus she had few funds to spare for the development of a land which to the present day needed a subsidy from the Home Government. Actually, Surinam has been on a "dole" or "relief" list of the Dutch Colonial Empire. Subsidies have permitted the land to exist, but adequate sums for proper development of the country have not been available.

¹ Philippe Fermin, *op. cit.* Page 110.

² Without Demarara and Essequibo which remained British.



Photo. U. S. Signal Corps

GOVERNOR'S PALACE, PARAMARIBO

To add to these difficulties, Paramaribo was destroyed by terrible fires in 1821 and in 1832. A fatal epidemic of yellow fever struck the colony in 1851. Many of the plantations were abandoned, and Surinam was at the low point of its history. In 1832, estates numbered 431; in 1846, there were 383; in 1853, only 263. In 1863 there numbered 217 estates, 41,000 acres of cultivable area, and 32,000 labor forces; in 1873, there were but 123 estates, 25,000 acres of cultivable area, and 13,000 labor forces.¹ A slow improvement in the economic life of the country then began, but progress was slow and far from being spectacular.

In 1863, the slaves were emancipated, but these Negroes served a ten-year period for wages before becoming entirely free. It was quite remarkable that no disturbances occurred between the blacks and the whites. Many slaves, however, after gaining complete freedom, refused to work at the estates. The lack of plantation labor was a serious problem, and action by the government was essential. In 1870, an agreement was made with the British government to permit immigration of coolies from British India to serve five-year contracts. The immigrant was entitled to a free passage home at the expiration of his indenture. Importation of Javanese labor began in 1890, and like the Hindu, has proved successful. The initial expense of such indentured labor is high, but Surinam has benefited from the resulting improved labor situation.

During the twentieth century, numerous plans for improving Surinam's economic status have been made. The dreams of a prosperous land based upon agricultural products have vanished before the barriers of a lack of capital, labor, and shipping. Gold mining boomed for a time, and the railroad was built from Paramaribo to Dam to open up the gold fields. The industry, like others, has declined.

At the present time, however, Surinam is coming into its own.² The world at war demands aluminum. Tremendous resources of

bauxite are found in the low hills of Surinam and offer marvelous opportunities too great to resist. Bauxite brings capital and shipping, and the necessary addition of labor causes the future to seem brighter. The government budget can be balanced, and the stigma of the "dole" removed. It may be possible, too, that Surinam may find capital for its agricultural endeavors, the true foundations of the economic life.¹

¹ Leading experts are inclined to the belief that the agricultural possibilities of Surinam are limited to small scale enterprise with medium yield.

¹ "British Foreign Office," *op. cit.* Page 38.

² Bauxite exploitation started already in 1922. Ed. Note.



SURINAM NATIVES WORKING THEIR BOAT, "CORIAL," THROUGH FALLS OF THE INTERIOR

Photo Philip H. Hiss

CHAPTER III

Environmental Picture

Lack of understanding of Surinam's geographic handicaps has often led to economic difficulties. The absence of exact geographic data has been a reason for this condition. Detailed study of such material is essential for the future welfare of the colony.

Physiography

The physiographic history of Surinam is undoubtedly a complex and interesting story, but a long period of intensive research under most difficult conditions would be necessary before a clean-cut interpretation of the facts could be obtained. A bare outline of the physiography is herewith presented.

- I. Old Mountain making period.
- II. Long period of erosion.
Table Mountain interlude.
- III. Deposition of wash materials—Pleistocene.
- IV. Invasion of the sea over the wash sediments to the present point of contact with fluvial marine deposits—Pleistocene.
- V. Uplift of the land exposing low lying coastal plain with series of barrier ridges running parallel to the coast.
- VI. Recent sinking of the coast land in relation to sea level.

The Territory may be divided physiographically into three regions: (1) The old worn-down mountain interior; (2) The continental wash deposits on the savanna land; (3) The recent fluvial marine coastal zone.

(1) The rock structure of the old age mountain landscape is a crystalline complex. A great number of rock types may be

found, but granite is the most common. The once mighty Guiana Mountains underwent long periods of erosion, and only the stumps of them are remaining today. The mountain slopes are not steep, and the highest point in Surinam is located in the Wilhelmina Mountains, a peak of 4,120 feet. An interesting chapter in the physiographic story of this area concerns the Roraima formation of sandstone at Tafel Gebergte (Table Mountain). Here an isolated deposit of sandstone is found overlying the old crystalline complex. Undoubtedly there was once a much wider distribution of the formation, but the erosional processes have left only Table Mountain as a key that may help in untangling the unknown physiographic history. At the boundary between the interior of old worn-down mountains and the savanna zones, falls occur in the rivers. These falls are partly due to the differences in hardness of the underlying materials in the two areas, and possibly also to the intersection of two peneplain levels of different ages.

(2) Sediments of sand, gravel, mud, and silt were carried by the streams and deposited at the base of the mountains in the zone of wash deposits. This continental alluvium¹ has a gently rolling landscape, and here the savannas are located. The region is usually called the savanna belt, but this gives a false impression, because the dominant growth is forest interrupted occasionally by grasslands. The origin of these grasslands is due to edaphic rather than climatic causes. Rainfall, not less than in surrounding territories, is adequate for the growth of trees, but rapid drainage in the coarse quartz sand favors growth of grasses. The sand found here is more angular and sharp than that found in the coastlands. Scattered hills indicate that the crystalline rock core comes near the surface and rocks may be seen in the river beds.

(3) A study of the development of the coastal plain has more important geographic implications than the other two divisions of Surinam, and fortunately a more accurate account of the physiography may be given.

¹ Term used by Ijzerman in "Geology and Petrology of Surinam."

Due to a sinking of the land sometime during the Pleistocene Age, the waters of the sea invaded the land, and fluvial marine sediments were deposited. This zone widens gradually from East to West, from 10 miles at the Marowynne River to 50 miles at the Corantyne. The materials deposited consist of clay, shell, and sand, for the most part and form an almost featureless surface. A few small hills are probably due to a rocky base, but most irregularities have been smoothed over by the thick coastal deposits. The materials of the plain were derived from the Amazon River mouth by the Equatorial Current. The coarse sands undoubtedly were local in origin, but the fine clays were probably brought from more distant sources. The movement of the Equatorial Current from East to West influenced the river patterns of Surinam. Depositions by the current at river mouths shifted stream courses to the West. Consequently, many rivers like the Commewynne and the Sarramacca flow nearly parallel to the coastline.

The stream patterns have been very beneficial to the colony, because they have furnished East-West transportation in the only productive region. Without this river traffic on the coastal plain streams, the development of Surinam would have been more retarded than it is. It is possible to travel from the French to the British Guiana borders entirely by boat, with only one man-built connection, the Sarramacca Canal. An unusual feature of *most of the streams*¹ is their great depths in contrast to their widths. This feature is probably due to the strong tidal currents and the holding capacity of the dense vegetation along the stream banks.

Sand and shell ridges, "Schelpritsen," are interesting features on the monotonously flat plain. These ridges run parallel to the coastline and represent former barrier beaches. The shallowness of the coastal water and an emerging land were favorable factors for the barrier reef formations thrown up by the surf. The low ridges, from two to six feet in elevation, became centers of settlement on the coastal plain because of their better drainage.

¹ This does not hold true for the lower parts of the streams. Ed. Note.

At the present time, such features in the process of formation cannot be seen along the Surinam coast, because the favoring factor of emergence is not present. Numerous cases of land sinking in recent times may be cited and the Nickerie region is an excellent example. The old village of Nickerie now lies under water, and the steady invasion of the sea continues. The first settlement of Coronie was made in 1801, and cotton plantations were established along the coast. The land was dyked, and the estates extended back to the shell ridges inland. Today, the town is built upon the shell ridges, as the coastline has been washed away. As one shell ridge peters out, the main road of the town shifts to another nearby ridge.

Near Braamspunt at the mouth of the Surinam River, a long beach has been washed away in the last fifteen years, and the mouth of the Warappa Creek, connecting the Commewyne River with the sea, at which place a military station and three plantations were once located, has been drowned.¹

The dip of sedimentary beds is very slight, and the characteristic belted land of the Atlantic Coastal Plain is not found here. However, a suggestion of a trellis drainage pattern may be noted. The age of the deposits is Pleistocene to the present, and in some of the shell ridges, used for road building, Indian implements have been unearthed. The surface near the coast is in the infancy of its erosion cycle, and swamps are the most common features of the land as seen from the air. With increasing distance inland, tributary streams become more numerous and larger in size. The most youthful topography is found naturally near the seacoast, and the greater the distance from the coast the more mature becomes the landscape.

The depth as well as the surface width of the coastal plain is greater in the West than in the East. Crystalline rock complex outcrops may be seen on the Marowynne River fifty miles from the mouth, but many times that width on the Corantyne in the West.

¹ "Geology and Petrology of Surinam," by R. Ijzerman. Page 12.

An oil boring in Nickerie was driven down about one thousand feet without striking rock structures.

The Pre-Cambrian complex of the interior forms a base for the overlying continental wash and fluvial marine deposits. The boundary between the interior of mountainous country and the savannas is quite sharp and is marked by falls in the rivers. However, the contrast between the coastal plain and the savanna belt is difficult to make. Geologically, there is a boundary, but physiographically there is little indication of a change. In summary, it may be said that the fluvial marine plain is characterized by extreme flatness of land, the continental alluvium zone has low undulations to interrupt the general level landscape, and the crystalline mountain region has a rolling topography with a typical worn-down mountain appearance.

Climate

Surinam has a typical rain-forest climate (AF)¹ due chiefly to its low latitude position on the northeast coast of continental South America. High temperatures throughout the year and heavy rainfall foster the growth of luxuriant vegetation which is so dense that little light penetrates to the forest floor. Seemingly rich in economic possibilities, this tropical land is sparsely inhabited, and for the most part lying idle. Even along the river arteries, it is possible to travel for many hours without seeing a human being. Climate is the dominant element of the environment in the lives of the natives with their primitive subsistence agriculture, the milpa type. Great progress cannot be expected here due to the high temperatures and humidity which create distinct handicaps.

Temperature

High average and uniform temperatures are outstanding features of the Guiana climate. Paramaribo, the capital of Surinam, has a yearly average of 27 degrees Centigrade (80.6 degrees Fahrenheit), and this is due to the low latitude position. Para-

¹ Köppen classification.

maribo has an average temperature range of only 2.1 degrees Centigrade (3.8 degrees Fahrenheit). The very small range of temperature depends chiefly on: (1) large amounts of moisture in the air; (2) nearness to the sea with the Northeast Trades carrying the ocean influence inland; (3) and the latitude. The forested interiors have but slightly larger annual range. Although less influenced by the sea, these tropical forests give off an abundance of moisture even during the dry season, and the ground is moist and shaded so that it heats and cools slowly. The monthly temperatures are not excessively high, but the monotony of heat without relief is the chief handicap. The hottest month (September) in Paramaribo is 28.2 degrees C. (82.7 F.), and in Nickerie it is 28.3 degrees C. (82.9 F.), which are slightly lower than July temperatures in San Antonio, Texas (83 degrees F.), and Galveston, Texas (83.3 degrees F.).

September and October are the hottest months of the year in Surinam, because dryer conditions then prevail, and average cloudiness is less. January becomes the coolest month, because then the lowest sun period occurs.

The daily range of temperature is several times greater than the annual range. The highest temperature ever recorded in Paramaribo was 99.5 degrees F., and the lowest 61.5 degrees F., so even the temperature extremes are not very great. A record high of 99.5 degrees may be compared with the 103 of Chicago and the 108 of St. Louis.

Surinam's daily temperatures seldom rise above 90 degrees F., but the high relative and absolute humidity makes conditions oppressive. Sensible temperatures are extremely high even though the thermometer does not register great heat.

Night is the winter of Surinam, but actually the temperatures seldom fall below 70 degrees F. However, the inhabitants are very sensitive to slight thermal changes and appear to suffer easily from colds. Even white men who have lived in the land

¹ "Introduction to Weather and Climate," by Trewartha. Page 203.



for some years cover themselves with blankets while the northern visitors find temperatures almost too warm for any sleeping at all.

Rainfall

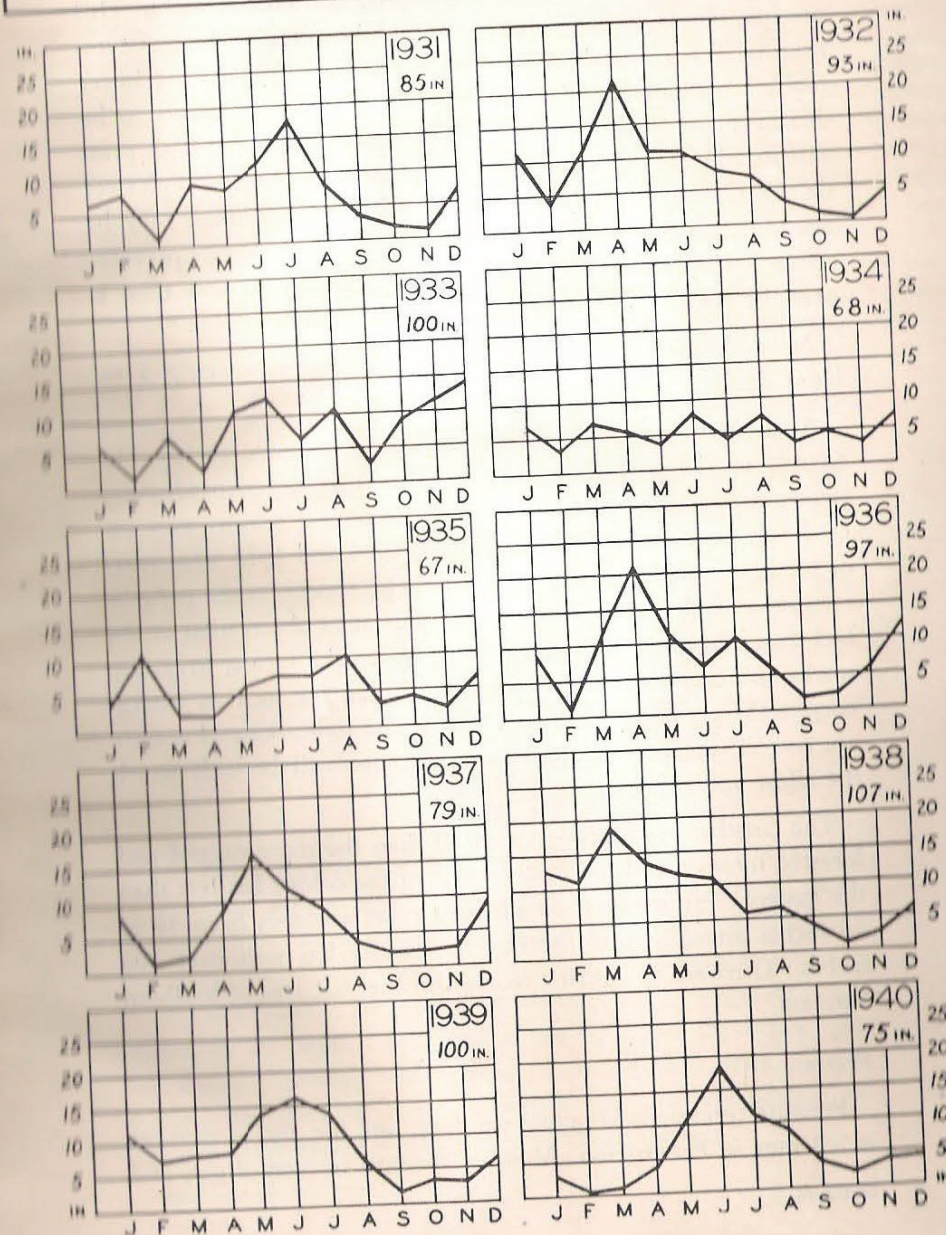
The rainfall of Surinam is heavy, and annual irregularity of amounts and distribution is an outstanding characteristic. Much of the precipitation is of the convectional type and usually falls during the warmer parts of the day. Trade winds blowing from the warm Equatorial current to the Guiana coastland contributes to the building of heavy rainfall totals. Variability of annual distribution may possibly be due to the irregularity of the Trades. Early mornings are generally clear, but cumulus clouds begin to form in mid-morning. By early afternoon, a shower or a heavy downpour may be expected. The rain furnishes temporary relief by cooling the air, but sometimes the sultry heat seems worse after a shower.

Graphs of rainfall distribution in Paramaribo have been prepared for the twenty-year period from 1921 to 1940, and they show the great variability. Average precipitation figures do not mean very much here. Paramaribo has an average annual rainfall of ninety inches, but in 1871, the figures revealed an average of 126 inches, and in 1899 only 48 inches. This irregularity is not the only perplexing problem in the study of Surinam's climate. The rainfall distribution is very complex, for the latitude of the land. Precipitation maximum is in May (12 inches), with a secondary maximum in December ($8\frac{1}{2}$ inches). The minimums are in October (3 inches), and in February ($6\frac{1}{3}$ inches). The same general rainfall pattern prevails throughout Surinam. May and June and July are the months of the greatest rainfall; September and October, the months of the least. December and January are quite generally rainy and represent the second maximum, while February is universally the second minimum.

No satisfactory explanation has been offered concerning the rainfall distribution, but the time of the daily rains may throw a little light on the subject. During the big rainy season, from March to August, showers come in the afternoons. This is ob-

Thirty-four

RAINFALL OF PARAMARIBO 1931-40.



viously convectional rainfall, and it coincides with the fall maximum at the mouth of the Amazon. However, during the short rainy period, from December to January, rain falls at night. This precipitation is probably due to nocturnal cooling of the moisture-bearing Trade Winds. Two possible explanations of the lower rainfall regimes are: (1) The February minimum seems to be due to higher pressure which offsets convection. This high pressure may be the most southerly extension of the general high over the Carribean. (2) The September-October minimum may be due to the steeper pressure gradient. High wind velocity prevents convection. The center of the continental low at this time is over the Amazon and Orinoco.

More detailed information is necessary before making a reliable analysis of the annual distribution.

A study of yearly variations reveals a climatic cycle. The records of the past show that a drought is experienced every twelve to fourteen years. The 1940 agricultural returns were exceedingly poor due to lack of rainfall; 1926 and 1912 were years of hardship, too, because of droughts. The reason for the periodic recurrence of dry years is not known, but mere observation of the fact may prove beneficial for the colony. In the future, irrigation works and other like provisions should plan for such an emergency in the period of 1952 to 1954. If the indications of a cycle are correct, the precautions against drought will be well worth the effort and expense.

The coastland receives less rainfall than the more rugged and forested Interior, and the western part of the colony has less than the eastern. Precipitation on the west coast averages from 58 to 66 inches annually, and the Interior usually has well over 100 inches. There are no climatic records for the vast area of southern Surinam.

Pressure

Pressure conditions are quite constant, and the annual average is 761 mm. in Paramaribo. Monthly changes are very slight, and

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there are never any marked low pressures. Consequently, there are no hurricanes.

*Winds**

The weak pressure gradients make air movement slight. In Paramaribo, the average is 2 (scale of 0 to 12), with maxima in February and September, the dry months. The lack of winds makes the climatic conditions worse. Discomforts of high temperatures and humidities with no breeze cause much discontent on the part of the whites. A breeze is a wonderful thing, and not to be shut off by screens. The Dutch would rather battle mosquitoes than risk blocking a slight wind.

Wind velocities are stronger along the coast due to the sea breezes. Nickerie and Coronie are much more pleasant than Paramaribo because of these afternoon breezes. These two towns average a wind velocity of 3 (scale of 0 to 12), and in February the velocity is 4. In the interior, at Kabelstation, the average wind velocity is only 1, as here the sea breeze has little if any influence.

Wind direction is very constant also, usually northeast and east, and ranging from north-northeast to southeast.

Humidity

Relative and absolute humidity is always high. In Paramaribo the yearly average is 81 per cent relative humidity.

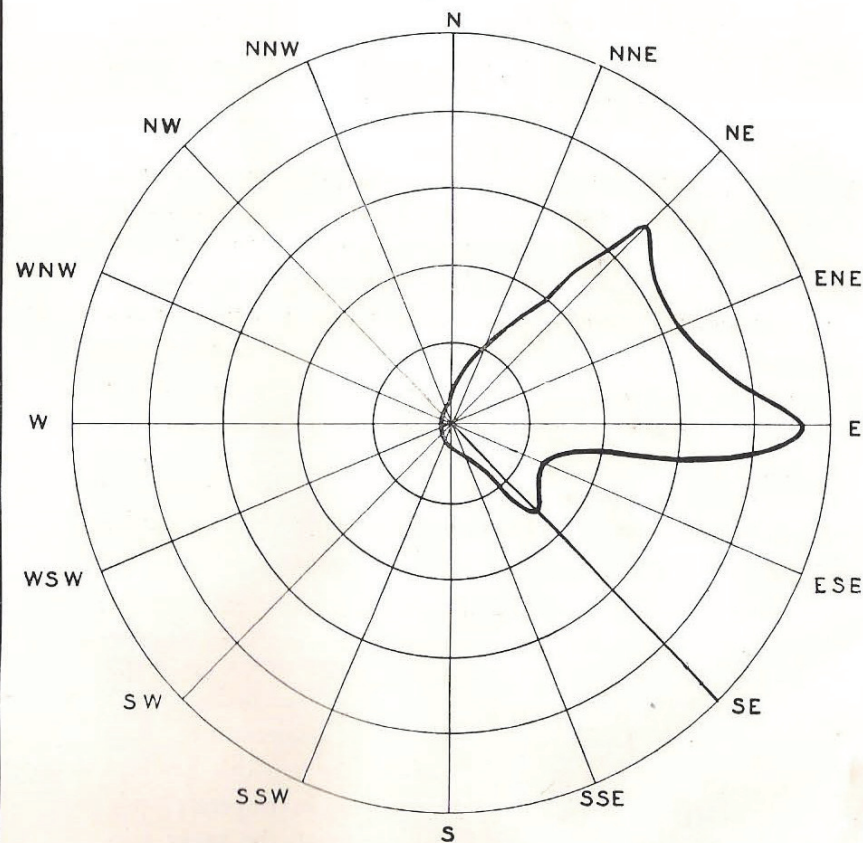
Soils

The rainy tropical climate of Surinam encourages a maximum of chemical and a minimum of mechanical weathering. Rock decomposition is rapid due to the warm temperatures, high humidity, and heavy rains. As a result, the regolith develops much more rapidly, and it is much thicker than in temperate lands. Although the depth of the soil is usually great, the heavy rainfall fosters leaching which removes the mineral salts. Consequently, the soils are not very fertile, and they are quickly exhausted when agriculture is practised continuously.

* See chart on next page.

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ANNUAL WIND DIRECTION IN PARAMARIBO



Laterites and lateritic soils are typical of the tropical rain forest climate. They are the result of severe leaching and therefore numerous mineral elements have been removed including many alkalis and alkaline earths. According to tests made by Dr. Muller, at the "Botanical Station" in Paramaribo, the soils of Surinam are extremely poor in calcium; they are low in phosphates; they are fair in potash; and they are quite high in magnesium. The materials that remain in the laterite soil are more or less insoluble, and they contain aluminum hydroxide, iron hydroxide, and silica. Since in general silica is more rapidly removed by solution than the other two elements, a fully developed laterite may consist of only iron and aluminum hydroxides.¹

The red lateritic soils have a deficiency in humus as well as in mineral salts. Even though the soil is covered with a dense vegetation, forests do not return as much organic material to the soil as grass, and the rapid oxidation of any organic matter allows but little humus to enter the soil. The abundant rainfall washes away material so that many Surinam streams are a dark coffee color from the organic matter in solution. Due to the lack of mineral plant foods and humus, laterites are generally considered poor soils. The infertility is partly offset by favorable climatic conditions for the plant growth. Long rooted crops which are able to obtain plant foods deep in the ground are best suited for the soil.

Milpa or migratory agriculture is a response to the infertility of the laterites. Bush Negroes and Indians clear small patches in the Big Bush by girdling the large trees and cutting the underbrush. Cassava and plantains are planted and cultivated in a crude fashion for two or three years. Then, because of exhaustion of the soil at the top of these crops, the clearing is abandoned, and a new site is exploited. However, soil depletion may not be the chief cause of abandoning these clearings. Dr. Fernandes, Director of Surinam's Agricultural-Economic Department, states that the more important cause is the difficulty of keeping the land

¹ Agricultural Yearbook, 1938, "Soils and Men." Page 973.

cleared of ever-encroaching undergrowth. Actually, it is easier to clear a new spot, because the floor of the Equatorial forest is quite free of the masses of vines and plants that litter a clearing after a short period of time.

The chief agricultural lands of Surinam are located along the rivers and near the coast on immature soils that are lateritic in character but not true laterites. These soils are much more fertile than those in the interior. The coastal belt is made up of heavy clay with occasional sand and shell ridges. The very acid clay has a PH of 4.5 to 5, and the texture is extremely fine. During the rainy season, the clay becomes a plastic mass, but in the dry season, it is very hard and cracks due to great shrinking. Soil conditions are nearly ideal for rice cultivation. The Javanese and British Indians live on the ridges and plant rice on the lowland clay soil.

Swamps are very common features of the Surinam landscape as seen from the air. The plant growth of these undrained spots builds up organic material so that there is a very high content of humus. Pegasse soil, which is highly acid, is an excellent coffee soil as long as the PH does not exceed 6 (iron is not in solution above 6). The drained swamp areas and soils are also excellent for the growth of rice.

Soils in the coastal zone have much greater possibilities than the more mature laterites of the interior. However, it should be clearly understood that the soils in general are poor in Surinam and that they are a distinct handicap to many agricultural ventures.

Transportation

The rivers form the transportation arteries of Surinam. River travel is cheap, and in most areas the only method possible. Because of the nature of the decomposition of the coastal area and the consequent influence of the Amazon Equatorial Current, some streams flow nearly parallel to the coast for many miles. It is therefore possible to travel by river and connecting creeks the



NATIVE RED INDIAN GIRL

Photo Philip H. Hiss

entire length of the lowland belt from the French to the British Guiana borders. The rivers are unusually deep for their widths because of the tide water influences. For example, the Cottica River at Moengo, more than one hundred miles from its mouth, is less than one hundred feet wide, but is twenty-four feet deep. The tidal currents are strong and serve to speed up or to slow down river traffic as the case may be. Mud banks at river mouths hinder the water transportation greatly. The bar at the mouth of the Surinam River prevents ships with more than a nineteen foot draft from entering. Dredging of the channel at this point is badly needed, but it has been considered too expensive a project by the Dutch government.¹

The rivers are navigable for motorboats to points where the first rapids and rock obstruct further passage. In the interior, no modern method of transportation by river is used, and the dug-out canoes of the Bush Negroes are common.² These Bush Negroes are marvelous boatmen, and they handle their canoes in a very skillful manner.

One railroad runs from Paramaribo southward to Dam, a distance of 173 kilometers. This railroad was built to furnish transportation facilities for the gold fields with the hope of opening up the interior. This dream was not realized, and at the present time the train runs once a week, and the rates are high. It costs more to ship gold from Placer to Paramaribo, sixty guilders a ton, than from Paramaribo all the way to the Netherlands. In spite of the high charges, the operating costs of the railroad are so great that the line loses money annually.

Roads have been built only in the coastal areas near the towns, particularly around Paramaribo. Plans for a more extensive road system in the coastal belt have been formulated, and work has already begun. Roads around the capital city are being extended and improved, especially the road linking Paramaribo to Moengo. The Albina to Moengo road, a narrow path cut laboriously

¹ The traffic on the river would not justify the expense. Ed. Note.

² Lately outboard motors have begun to be used. Ed. Note.

through the jungle is also being improved. The route has great strategic importance, because it is the only road in eastern Surinam, and it leads from the French Guiana border to the bauxite center, Moengo.

A highway is now being constructed which will connect Coronie with Paramaribo. A good part of the work has been completed and eventually this system will be extended westward to Nickerie. When this road is finished, an improvement in the economic status of this section of the colony may be expected.

Road building is a very difficult task because of numerous environmental conditions. The dense vegetation is a great handicap, and the expense of cutting a highway through the rain forests is also great. That does not complete the job, however, for the vegetation must be eternally cut back to keep it from engulfing the road. Soils and topographic conditions also hinder the development of a road system. Heavy clays and swamps are tremendous barriers. The lack of proper building materials, equipment, capital, good labor, added to the enervating climate, only serve to emphasize the Herculean task of road construction in Surinam.

Surinam's deficiency in rail and road transportation has led to increased interest in the development of air travel. Pan American and K.L.M. (Royal Dutch Line), stop weekly at Paramaribo. The south bound Pan American clipper makes a regular stop every Saturday, and the north bound every Sunday. The K.L.M. offers weekly service every Wednesday to Curaçao and Venezuela. Brazil to the south, and the Caribbean Islands and the United States to the north, are brought into closer contact by Pan American. A large amount of American capital is being invested in Surinam in the building of two air bases, one a sea plane base, at Paramaribo, the other a land plane base, at Sanderey, about thirty miles from the capital on the railroad line. Pan American is building these bases with the backing of the United States government. The base at Paramaribo will be used for regular Pan American service, but the Sanderey project is entirely of a strategic

value, to be used as a base by the air force of the United States.

Air transportation carries chiefly passengers and mail, and great savings in time are thereby effected. Closer international and regional relations are fostered by this service. However, this does not eliminate the pressing need for more railways and roads. The airlines offer a speedy but expensive service; yet they cannot handle the bulky agricultural and mineral products of the land. Improved transportation is one of the answers to the perplexing question, "How can we make Surinam a paying colony?"

Steamship lines to the world markets is another difficult problem of Surinam. One of the outstanding handicaps in the economic sphere is Surinam's location off the trade route lines of the world. Formerly a Dutch steamship line sailed once every three weeks from Surinam to Holland. The Alcoa bauxite boats do carry passengers in normal times, but at present travelers must use the expensive air routes of Pan American or of K.L.M. This kills effectively the tourist industry which could have great possibilities if properly managed.

More serious than the passenger problem is the question of freight for exports and imports. The bauxite lines naturally concentrate upon the shipment of the aluminum ore, and the agricultural products of the colony do not find a happy combination of shipping and markets. Many of the ports of call of the bauxite boats in the Caribbean or the southern part of the United States are not interested in Surinam's products. Other potential markets are not tied to Netherlands Guiana with the necessary shipping link. The small amounts of agricultural crops produced do not make feasible the establishment of new steamship routes. The dilemma of Surinam is then a vicious circle.

Shipping facilities are not provided because of the insignificant amounts, and production does not increase because of the inadequacy in shipping. Consequently, delicious pineapples are sold for very little on the local markets, the "Big Bush" conquers the coffee plantations,¹ and the bananas have difficulty in finding a

¹ Surinam coffee suffers from the competition of lower grade Liberia coffee. Ed. Note.

market. This is the sad plight of Surinam's agriculture, and all attempts to cure economic plight are bound to fail, unless the shipping problem is faced squarely. Obviously, great capital expenditures are necessary in both shipping and in agriculture in order to eliminate the trying economic situation of the present time. The Netherlands government did invest in both of these fields but not in large enough amounts to aid her poor colony. That lack of heavy capital investment by the Netherlands government is understandable, as her chief colonial interest, the East Indies, offered many more opportunities than nearly forgotten Surinam.¹

Population

In modern geography, man plays a key role. He is the agent which creates the cultural landscape and is at the same time an element of environment. A true reciprocal relationship between man and environment may be observed in Surinam. The job of man is to discover and to take advantage of the possibilities of his physical environment. The Dutch have been tremendously successful in this task in the Netherlands, and they may well boast that "God made the world, but the Dutch made the Netherlands." The energetic Dutch attempted a similar project in Surinam, and the polder lands in the low coastal belt show the results of their efforts. However, only slight advances have been made against the Equatorial Rain Forest, and it may be said that man has largely failed to conquer Nature in this colony.

Knowledge of the population problem is essential for an understanding of conditions in Surinam. Probably in no other place in the world would one find such a cosmopolitan population. Negroid, Oriental, and Caucasoid races are all represented, and the polyglot composition of these races is one of the most remarkable features of the land. The major group of the total population of 181,044 is Creole (Negroes and half-breeds), numbering

¹ The author omits to point out that the small quantities of the products mentioned are in the first place due to underpopulation and shortage of labor. Ed. Note.

Population Chart

	Paramaribo		Commeuwyne		Coronie		Marowynne		Nickerie		Saramacca		Swinam		Total	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M. & F.	M. & F.
Europeans:																
Born in																
Netherlands	523	321	26	20	3	6	20	14	13	9	3	4	44	21	1,027	
Elsewhere	500	287	64	6	1	1	1	—	4	2	—	—	97	52	1,015	
Natives	19,162	24,534	1,884	1,638	2,046	2,107	1,630	995	2,145	2,149	1,108	1,027	5,270	4,514	70,209	
Netherlands																
Indians	464	486	9,603	7,804	104	95	452	291	1,650	1,534	1,508	1,211	4,912	4,251	34,365	
British Indians	2,765	2,630	2,677	2,489	35	28	22	10	3,756	3,646	2,156	2,265	13,042	11,463	46,984	
Chinese	1,216	395	71	11	15	2	45	35	75	49	41	—	232	71	2,258	
Others	1,207	990	148	32	—	—	227	118	256	161	10	2	239	151	3,541	
Totals	25,837	29,643	14,473	12,000	2,204	2,239	2,397	1,463	7,899	7,550	4,826	4,509	23,836	20,523	159,399	
Totals M. & F.	55,480		26,473		4,443		3,860		15,449		9,335		44,359		159,399	
Bush Negroes	—		162		—		6,225		—		1,645		11,000		19,032	
Aboriginal Indians	—		78		—		750		173		863		752		2,616	
Grand Totals	55,480		26,713		4,443		10,835		15,622		11,843		56,111		181,047	

70,209. The African base of the population is due to the early policy of operating plantations with slave labor. Besides the "town Negroes," (Creoles), there are also 19,032 Bush Negroes. Together, these two Negro groups make up nearly one-half of the total population.

Slave trade was abolished in 1808, and in 1863 all the slaves were emancipated. This was a severe blow to the plantations whose prosperity was based upon the slave labor. Many of the freed slaves went to the towns, especially Paramaribo, or to join the Bush Negro tribes in the Interior. To this day, the Negroes have an aversion for the plantation work, and associate all agricultural labor with the old slavery.

The Emancipation was followed by the abandoning of many estates. In desperation, the planters turned to other regions in the world for a labor supply. Portuguese were brought in, but this venture did not succeed. Some of the Portuguese remained, and their descendants today are among the leading citizens of the colony. Chinese were brought to the country, but they failed to offer a permanent labor supply, as most of them departed at the termination of their contracts. The present Chinese settlers, numbering about 2,255, are engaged chiefly in shop-keeping and in the professions, and they are highly respected in the colony.

In 1870, an agreement was made with Great Britain to permit the immigration of contract laborers from India. A migration of Hindu workers to British Guiana occurred at this time also. The 46,984 British Indians have adapted themselves quite well to their new environment. The Javanese settlement of 34,365 may also be considered as a success. Eighty percent of those who came on contract remained in spite of the privilege of a free passage to return home. Under the present system, at the conclusion of the contract, the worker receives 100 guilders and a piece of land from the government so that a small individual farm may be established.

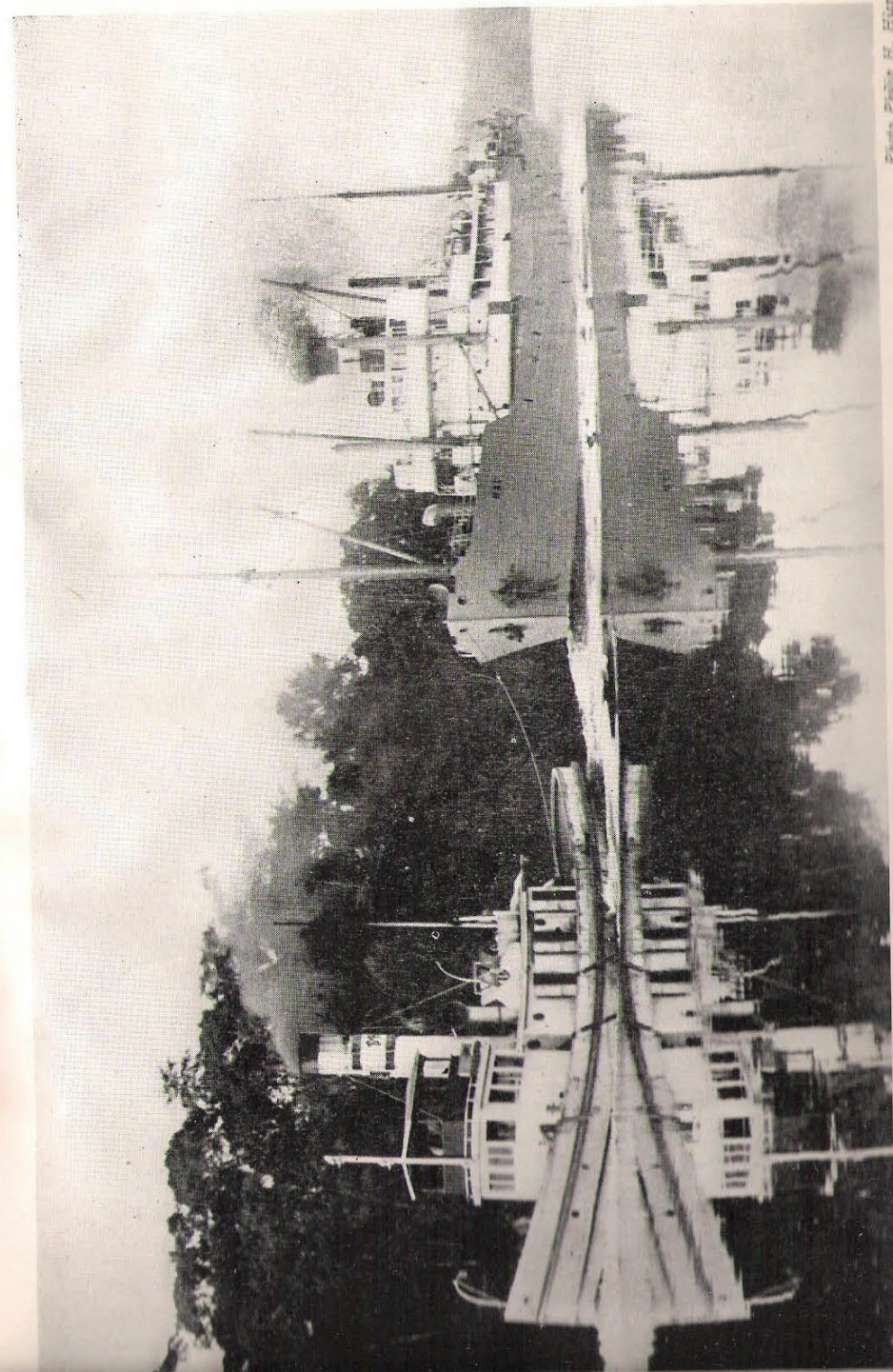
The 2,616 aboriginal Indians live in the Interior. They are primitive natives of the Arawak and Carib tribes, and their occu-

pations are hunting, fishing, and gathering. They are slowly dying out, and they do not seem able to stand the competition of other groups, especially the Bush Negroes. Except for Balata bleeding, the Indians do not engage in any activity of economic importance to the colony as a whole.

The white population of 2,042, one-half of which is Dutch, takes the most active part in the management of the estates and the running of the government. The problem of white settlement in Surinam is discussed in "De Mogelijkheid van Landbouw-Kolonisatie voor Blanken in Suriname" by E. F. Verkade-Cartier van Dissel. The first attempt by Dutch farmers to work the Surinam soil was in the Sarramacca district in 1845 and was a failure. A sequel to this was the settlement in 1849 by Dutch farmers near Paramaribo. The fourth and fifth generations of descendants are living there now, and although little traces of degeneration are noticed, these people do not seem strong and healthy. Economically the whites cannot compete in cattle raising with the British Indians.

The whites in the government and business positions are of a much higher standard than the farming group. Many of the officials have served periods of time in the East Indies. They are skilled administrators, but most of them prefer conditions in the East Indies and wish for a quick return to the East. The pettiness of Surinam's problems irk them, and the inevitable comparison between Java and Surinam is made. Java, the richest colony of the world where administration is an inspiring and challenging job—Surinam, a liability as a colony, where seemingly minor problems are unsolvable.

In spite of the numerous economic difficulties, the population of Surinam has increased steadily since 1890. The census of that year revealed less than 60,000 inhabitants while the present population numbers more than 180,000, an increase of threefold in fifty years. Most of this growth is due to the importation of contract laborers from the Far East, and to the high birth rate as compared with the death rate. The combined total of British



Indians and Javanese now number more than 81,000, or about 45 per cent of the total. The vital statistics of 1939 show the typical birth and death rate figures. In that year there were 4,740 births and 1,876 deaths, or 26 births per 1,000, and 10 deaths per 1,000 population. This proportion is highly favorable for a rapid, natural growth of population.

Health Conditions

Health conditions are surprisingly good. Paramaribo has an exceptionally fine health record. The most serious disease problem from the point of view of white settlers is malaria. A study of historical records shows that many of the failures in white colonization were due to the malarial epidemics. It is not possible for whites to colonize a region until malaria is controlled. The coastland of Surinam is now practically free from this disease, but the Interior is heavily infested. Bush Negroes are carriers of malignant malaria, as they harbor a large number of parasites with little inconvenience.¹ It is possible to control the disease as shown by the example of Moengo which was once terribly malarial, but at the present time, health conditions there are excellent.

The death rate is no worse than that of the United States. Too great emphasis has been placed on the favorable health conditions in explaining colonization failures. Factors in economic geography have been far more important in limiting success.

The government medical staff has done much to bring about good health conditions and is constantly fighting the tropical diseases. Paramaribo has two well equipped hospitals, Moengo has an excellent one, and there are several small hospitals in the rest of the country.

Education

The Dutch are well known for their great interest in education, and this is reflected in Surinam. For the population of 180,000 in 1939, there were 44 public and 76 private schools

with an attendance of 6,734 and 15,648 pupils respectively. Four of these schools are colleges, forty give a full primary course, the staffs of which consist of 496 graduate teachers and 70 non-graduate. The rest of the schools are in the rural districts. Many specialized and advanced courses are offered also, and among them are training courses for doctors, druggists, and engineers. Vocational schools and a laboratory for agriculture are also maintained. The sponsorship of education by the Dutch here in Surinam is far above the average for colonies.

Religion

Complete religious liberty prevails in Surinam. The Reformed Church receives the support of the high governmental officials, but the Moravian Brethren and the Roman Catholics have done much more work in the mission field. The missionaries undoubtedly have done much good, but their work has not been an unmixed blessing. Laziness among the natives seems to be often more pronounced in the mission settlements because the Creole converts feel that they will be supported if they work or not. In 1940 the religious groups had the following memberships: Reformed and Lutheran 13,200; Moravian Brethren 31,469; Roman Catholic 30,547; Jews 830; Mohammedans 41,620; Hindus 82,860; Confucians 1,391; Others 4,415.

Land Tenure

In general, the agricultural economy of the population may be divided into five social types.

1. Plantations exploited more or less by western methods.
2. Government settlements of small tenant farmers.
3. Private settlements of small tenant farmers.
4. Settlements of small farmers on property grounds.
5. Small farmers on rented or property grounds, not joined in settlements, living at rather great distances apart from each other. This situation is found mostly along the upper parts of the rivers, and concerns Creoles for the most part.

Fifty-one

¹ "Journal of American Medical Association," May 31, 1941. Page 2554.

Until recent years the government settlements had no administration of their own. They were directed by the District Commissioners and their officers. Governor Kielstra introduced the present system whereby the government settlements are made village communities with administrations of their own. The major purpose was to make the village community self-supporting if possible and to give a better organized system of administration to the country. The government gives the village ground on long lease to the community which rents it to small farmers. Annual rent is no more than ten guilders per hectare. Until now, only government settlements were made into village communities for the obvious reason that only the government had the money for such projects. Plantation owners are bitterly opposed to the self-supporting village plan, because they argue that it only serves to make plantation labor more difficult to obtain.

One of the greatest difficulties in the establishment of successful village communities is the heterogeneity of the population.

Family Income and Expenditures of Three Racial Groups

A detailed study of the incomes and expenditures of three agricultural families is interesting, and it presents an excellent comparison among the three major laboring groups, Creole, British Indian, and Javanese. The three type studies are: (1) Egbertus Bernard MacDonald and family, Creoles of Friendship settlement in Coronie; (2) Chander 100 and family, British Indians of van Drimmelen Polder in Nickerie; (Contract laborers usually were given numbers and these were kept as part of their official names.) (3) Sanmoestaman and family, Javanese of La Simplicite Plantation.

Egbertus Bernard MacDonald, Surinamer, of Friendship in Coronie.

Family: man, wife, and ten children.

Number of bearing coconut palms: 614.

Size of farm:	10.68 hectares
Area planted with coconut palms:	8.28 "
Area planted in rice:	2.40 "
Number of nuts harvested:	52,000 nuts
Amount of rice harvested:	106 sacks

INCOME OF THE FAMILY		EXPENDITURES OF THE FARM	
	<i>Guilders</i>		<i>Guilders</i>
80 five-gallon tins of coconut oil from 20,000 nuts @ 3.60 per tin.....	288.00	Picking of 36,000 nuts @ 20¢ per 100.....	72.00
106 sacks paddy rice @ 2.00 per sack.....	212.00	Shelling 36,000 nuts @ 20¢ per 100.....	72.00
16,000 chopped nuts @ 2.25 per 100.....	360.00	Transporting 16,000 nuts @ 10¢ per 100.....	16.00
16,000 unchopped nuts @ 1.20 per 100.....	192.00	Freight of 16,000 nuts @ 60¢ per 100.....	96.00
Yearly salary earned by helping at the school...	60.00	Wages to hired man.....	132.00
		House tax	4.69
		Land tax	2.25
		Balance	757.06
Total	1,112.00	Total	1,112.00
Living expenses and other necessities for family..		274.56	
Clothes necessary for family.....		247.50	
Tools		4.40	
Total		526.46	
Family income		757.06	
Profit		230.60	

Chander 100, British Indian of van Drimmelen Polder in Nickerie.

Family: man, wife, and six children.

Workers: man and wife.

Size of farm: 17.4 hectares
Area planted in rice: 7.22 "
Amount of rice harvested: 300 sacks

INCOME OF THE FAMILY		EXPENDITURES OF THE FARM	
	<i>Guilders</i>		<i>Guilders</i>
300 sacks paddy @ 1.75 per sack	525.00	Temporary hired help....	200.00
Milk sold in market.....	164.25	House tax	5.50
Income as hired man.....	50.00	Land tax	4.20
		Polder fees	25.30
		Freight charges	12.50
		Balance	491.75
Total	739.25	Total	739.25

Living expenses and other necessities for family..	217.70
Clothes necessary for family.....	65.00
Tools	9.00
Total	291.70
Family income	491.75
Profit	200.05

Sanmoestaman, Javanese of La Simplicite.

Family: man, wife, and seven children.

Number of workers: man and wife.

Size of farm: 2.40 hectares
Area planted in rice: 0.81 "
Area planted in diverse crops: 0.03 H.A.
Amount of rice harvested: 25 sacks

INCOME OF THE FAMILY		EXPENDITURES OF THE FARM	
	<i>Guilders</i>		<i>Guilders</i>
25 sacks paddy @ 2.50 per sack	55.00	Free from all taxes, land rent, and wages for hired help, being member of the village community, "Vestiging"	
2 sacks cassava @ 1.50 per sack	3.00	Balance	222.50
18 chickens @ 50¢.....	9.00		
6 goats sold	18.50		
Wages in hiring out 13 weeks @ 5.00....	65.00		
12 weeks @ 6.00....	72.00		
Total	222.50		222.50

Living expenses and other necessities for family..	78.00
Clothes necessary for family.....	30.00
Tools	4.00
Total	112.00
Family income	222.50
Profit	110.50

Government

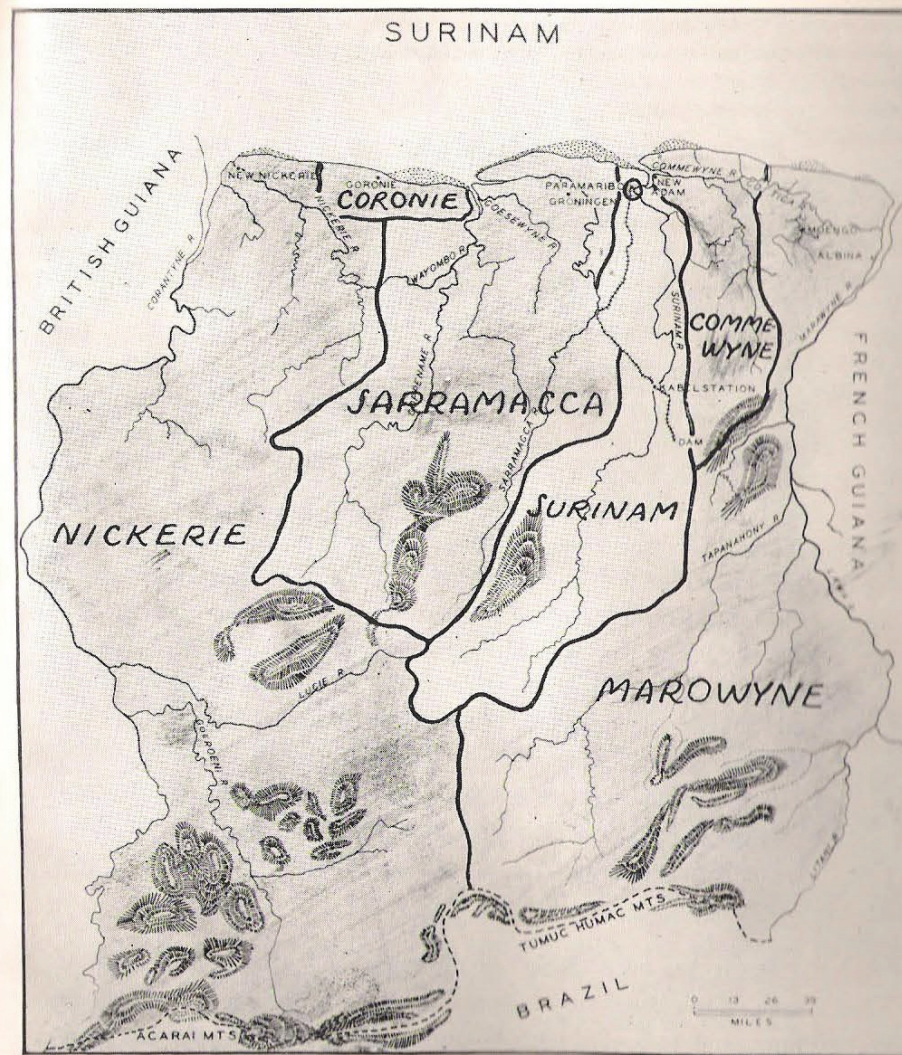
Administration and executive authority in Surinam are in the hands of the Governor, with an advisory council consisting of the governor as president, a vice-president, and three members all appointed by Queen Wilhelmina. The Legislative Assembly (the

States) comprises fifteen members, ten of whom are elected by the citizens according to a system based upon income and educational qualifications. The electorate numbers only a small percentage of the total population. The remaining five members are appointed by the governor. Members of the States serve a term of four years. Control over the finances of Surinam has been exercised by the States-General of the Netherlands since governmental expenditures have consistently exceeded the revenues, and the budget had to be balanced by a subsidy from the treasury of the mother country.

The most important governmental departments are as follows: (1) Secretariat; (2) Attorney-General; (3) Finance; (4) Education; (5) Health and Sanitation; (6) Public Works; (7) Agricultural Experimentation; (8) Rural Economics; (9) Military.

For convenience in administration, Surinam is divided into six Districts and the city of Paramaribo. The six Districts are: (1) Nickerie; (2) Coronie; (3) Sarramacca; (4) Surinam; (5) Comnewyne; (6) Marowynne. These Districts and Paramaribo are administered by Commissioners appointed by the governors. These regional directors are in most cases very superior men, many of them having had experience in the Netherlands East Indies. The typical Commissioners is administrator, advisor, and arbitrator in his District. He must supervise all governmental activities besides settling disputes and acting as a peacemaker in the private troubles of the natives. Too many petty difficulties have fallen upon the shoulders of the average Commissioners, and it is fortunate that now the heads of organized village communities assume some of the duties.

DISTRICTS



MAP II

CHAPTER IV

Economic Geography

Agriculture

Many misfortunes have struck Surinam's crops, but in spite of tragic difficulties, agriculture is still the most important industry, and it must be placed upon a sound foundation before the region can achieve permanent prosperity. "Surinam has become an agricultural colony to such an extent that the history of agriculture may be regarded as the economic history of the country."¹

Cultivation is practiced exclusively in the fluvial coastline, and as this region is below the level of high tide, it must be enclosed by dikes. The areas are drained by ditches and canals, and the excess water runs off at low tide by the opening of sluice gates. Reclaiming the land from the sea, a difficult task to be accomplished, was undertaken in the colonial period by Dutch settlers and their slaves. The "polder" landscape illustrates dramatically the influence of these Dutch in this tropical colony. Polder soil is quite fertile, and tobacco, sugar, cotton, cacao, coffee, bananas, and rice have all flourished at some time. Many of these crops no longer hold important places in the Surinam economy so that today only 150 square miles are cultivated from a possible 1,400. The former failures are psychological handicaps to progress, and so without unnecessary lamentations over the rather dismal past, let us look to the present.

Sugar

Sugar was once "King" of the colony, but that is far from true now. Only three sugar plantations are operating at the present time, and two of these, Alliance and Waterloo, produce insig-

¹ "Encyclopedie van Nederlandsch West-Indie," published 1917. Page 440. This statement does not hold true since bauxite became such an important item in Surinam's economy.

nificant amounts. An excellent idea of the Surinam sugar situation may be obtained therefore by studying the only large and active plantation, that of Marienburg.

In the general struggle for survival, Marienburg possessed a number of advantages which permitted it to continue while other sugar areas reverted to the jungle. This plantation is located on the lower Commewyne River and operates on a large scale. Adequate capital resources allowed the installation of more modern equipment than found elsewhere in the country. Piers on the Surinam River accommodating ocean-going vessels, a small-gauge railroad which can carry cane to the "Fabriek," and efficient factory machinery, all contribute to making this a model estate for Surinam.

The size, 5,300 acres, and the large working population, 4,400, gives Marienburg outstanding importance. Therefore, the government has felt that the industry must be artificially supported by a heavy tariff. On the Paramaribo market, the price of brown sugar is 17 guilders a bag per hundred kilograms, and for white sugar, 22 guilders. However, for export to London the price for white sugar is only 4.50 guilders. Before the war, the sugar exporters were even less fortunate, because in shipping to Holland, they received only 4.50 guilders, and in addition had to pay one guilder shipping costs. It is obvious that the tariff barrier supports the Surinam sugar industry by preventing outside competition on the local market.

The cultivation of sugar is maintained almost entirely by manual labor, because the numerous drainage ditches and the heavy clay soil prohibit the use of agricultural machinery. Digging must be done with a spade, and the canes are planted a foot apart in rows separated from each other by the distance of a yard. When the plants reach a height of approximately two feet, the soil is heaped up around the base of the stalk by means of a shovel. In fourteen or fifteen months, the cane is ready for the harvesting, this taking place during the July to November season.

The cane is cut as close to the ground as possible leaving the roots as ratoons. Nine or ten ratoon crops, and now even more, are produced before the field is flooded for a number of years in order to restore the soil fertility.

After the cane is cut, it is taken to the factory by railroad cars. At the "Fabriek" the cane is crushed by powerful rollers, and the extracted juice is then boiled in "vacuum pans" and crystallized in the centrifugals. From here, the sugar is taken to the shipping room where it is sacked and made ready for the market. The process of manufacturing sugar yields certain residual substances from which rum and molasses are derived. When the price of rum is high as at the present time, less molasses is made.

A full understanding of the sugar situation may be best obtained by a survey of the favorable and unfavorable geographic factors influencing the industry.

Favorable Geographic Factors:

1. High temperatures throughout the year permit rapid growth of the cane. Ratoon crops are possible because of the continuous growing season.
2. Rainfall is usually adequate, and the average precipitation around Marienburg is 90 inches. The growing cane demands much moisture, and the heavy convectional rainfall supplies this need.
3. The dry season starting in August increases the sucrose content of the cane, and it is at this time, therefore, that the grinding period occurs. The average sucrose content during the milling season is nine to ten percent. Working conditions are made easier at the time of cutting due to the dry soil.
4. The heavy clay soil of the polder is quite rich and yields thirty tons of cane per acre without the use of fertilizers. The newly planted fields produce thirty-six to thirty-eight tons, and the old plots twenty-six to twenty-seven tons per

acre. Due to the combination of sucrose content, 2.5 to 3 tons of sugar can be obtained per acre.

5. The heavy protective tariff which raises artificially the price four or five times over the world market figure is the major prop supporting the ill-adjusted industry.
6. Large-scale operations and plenty of new land for expansion enable Marienburg to dominate the industry.
7. The location of the estate on the lower Commewyne River at the junction with the Surinam River permits easy shipment to Paramaribo, the chief market, or to foreign ports.
8. Immigration projects by the government have aided the labor situation.

Unfavorable Geographic Factors:

1. There is lack of water during the drought periods. This is the chief environmental difficulty. Although the average precipitation is heavy, the seasonal distribution and the annual variations are great handicaps. Irrigation would solve the problem, but this would require an expenditure of large sums of money which are not available.
2. Labor supply is inadequate in spite of the government attempts to replenish workers by immigration from Java. Most of the imported laborers leave the estates as soon as possible and settle down as small farmers. In 1935, Marienburg employed 1,821 workers, and in 1938, the figure had decreased to 1,278.

The cost of labor is not cheap compared to the Far Eastern standards, and so Surinam cannot compete with Java in the Netherlands market. A man in Dutch Guiana receives sixty cents a day (Dutch), while a woman receives forty.

3. The absence of a good market is a tremendous handicap. British Guiana is able to continue sugar plantations on a

much larger scale because of the preferential treatment in the British Empire market. Surinam does not have this good fortune, and the Netherlands was far more interested in the welfare of Java.¹

4. The heavy clay soil is difficult to work, and this is one reason for non-use of agricultural machinery.
5. Drainage of the low-lying polder land requires supervision and work on the canals and ditches, naturally increasing the cost of operations. The maze of drainage trenches prohibits use of machinery also.
6. New land is cleared of the dense equatorial rain forest with difficulty, and the expense is great.
7. Transportation is a trying problem because of Surinam's position off the main trade routes of the world.
8. Adequate capital resources are not available so that necessary improvements such as irrigation works may not be established.
9. Competition offered by larger and better adjusted areas and also the beet sugar regions is too keen for a sub-marginal producer like Surinam.
10. Diseases, pests, and weeds cause considerable damage and increase the expense of output. For example, a small flowering plant, designed to hold back the dust of the railroad path, is now migrating steadily into the fields and destroying the sugar plants. It is appropriately called the "Cane Killer."
11. Management of plantation has not maintained a unified and consistent policy. Managers seem to have the habit of dreaming of the prices during World War I and not facing present realities. The manager of Marienburg today does not believe in clearing new land; and during the last two

¹ In the last few years Marienburg has been given a subsidy on exports to the Netherlands. Ed. Note.



MAIN STREET AT PARAMARIBO (GRAVENSTRAAT)

years only 500 acres have been replanted; the former director had cleared 200 acres of forest a year and planted 800 to 900 acres annually. The present manager, therefore, is now reaping the benefits of past policies without a high labor cost, but the short-sightedness of his administration will inevitably be demonstrated. Ratoon crops yield smaller amounts of sugar each year, and if the present method continues, the production of sugar will naturally decrease, allowing Marienburg to follow the customary road of failure and bankruptcy of Surinam's sugar estates.

12. The low price of sugar on the world market since the last war is undoubtedly a cause for the decline of Surinam's sugar plantations. Naturally, marginal producers suffer more than the well adapted regions like Cuba.
13. High protective tariffs have eliminated some possible markets such as the United States.
14. The present war has cut off the Netherlands market, the major buyer of Surinam's sugar before 1939.

A comparison of the advantages and disadvantages shows clearly that the sugar industry is geographically unsound. The government has been attempting to rescue business by the protective tariff and by Javanese immigration policies, but under the present conditions it is doubtful whether the expense to the colony is justified. Sugar could be purchased more cheaply on the world market than the estates can raise it. However, the problem of what to do with the population of the plantations, especially the 4,400 people at Marienburg, is a perplexing one. The government has decided that no drastic step can be taken, so that the once glorious sugar industry is now a Surinam W.P.A. project. Improvements are possible on the estates, but many problems first must be solved, and it is questionable if the future will bring prosperity to the sugar planters.

Production and Export of Sugar — 1935-1941*

Year.	Production 1000 kg.	Export 1000 kg.	Guilders	Average Market Price Per kg. Cents	Chief Markets	% of Value
1935	17,345	15,065	482,083	3.2	Netherlands British Guiana Great Britain	90 6 4
1936	18,334	16,115	427,060	2.6	Netherlands British Guiana Great Britain	92 3 5
1937	15,564	12,233	621,992	5.1	Netherlands British Guiana Great Britain	93 6 0.7
1938	12,856	10,920	546,016	5.0	Netherlands Great Britain	95 5
1939	11,154	8,282	410,353	4.9	Netherlands Great Britain Curaçao	91 4 4
1940						
1941						

* "Surinaamsch Verslag 1938 and 1939," Department van Landbouw en Economische Zaken. Page 109.

Coffee

Coffee was introduced as an estate crop early in the eighteenth century, becoming one of the staple products, and from Surinam, the cultivation of coffee spread to Brazil, Venezuela, Columbia, Central America, and the West Indies. During the nineteenth century, an apparent decline occurred in the industry in Dutch Guiana, due largely to the scarcity of labor after the emancipation of slaves, and also to the competition from other areas, but in the twentieth century the planters decided to try their luck with coffee once again, and high prices for their product accelerated the swing from the declining cacao and banana industries. Arabica and Liberian coffees are raised, but at the present time the concentration is upon the latter.

An inspection of the estate, "Ma Retraite," located at the outskirts of Paramaribo illustrates the major features of the Surinam

coffee position. The plantation is approximately one thousand acres in size and is carefully criss-crossed with canals for drainage and transportation. The estate has had planted on its polder soil many different crops at various times, and thirty years ago the major crop was cacao, but this has practically disappeared due to the witch-broom disease.

The physical factors of climate, soil, and topography are not ideal according to the usual requirements of coffee trees as given in the text books of economic geography. Temperatures are too high, and therefore shade trees, the "Kaffee Mama," *Erythmia*, must be planted and regularly trimmed. This latter process is of course highly expensive. The dry season is the hot season in Surinam, and this hinders working conditions; heavy rainfall creates drainage problems and also possible injury to the blossoms; and periodic droughts reduce the yield of coffee considerably. The clay soil is not extremely fertile, and the land is below sea level, not on "typical hillsides."

In spite of physical handicaps, coffee grows surprisingly well. The trees, with a striking dark green foliage, grow strongly and healthily, and come into bearing in the third year, yielding heavily by the fifth year. Some trees on the estate, Ma Retraite, are over thirty years old and still producing well. The average height, twelve to fifteen feet, makes necessary the use of ladders for collecting the "cherries." Fortunately, from the standpoint of labor distribution, there is no definite seasonal fruiting, and flowers and cherries may be seen at the same time on the same tree.

The picked cherries are brought to the mill by boats on the "leidings," narrow canals, and in small railroad cars. At the plant the hulls are removed, and beans are washed and allowed to ferment for twenty-four hours. After the skins, pulp, hull, and silver fleece are removed, the coffee is dried. In all, the process requires two and one-half days, from the cherry stage to the finished product.

Ma Retraite produces 3,500 to 4,000 bags of coffee a year, each bag containing 90 kilograms. The working group numbered

125 in July of 1941, but double this amount could have been employed if it had not been for the unsound condition of the industry making extra expenditure inadvisable. During the main harvest season 600 to 700 laborers are used, most of them being Javanese or British Indians who are provided with their own homes and garden plots upon the plantation. The standard wage is sixty cents a day for a man and forty cents for a woman. Picking is paid for on a "piece work" basis, and at Ma Retraite the rate is seventy cents per one hundred kilos, although the usual rate is sixty cents at the other estates. This increased wage pays for itself by bringing in more coffee.

The tropical rain forest climate, heavy clay soil, and low elevation do not handicap the growth of trees, but like most situations in which the plants are producing highly flavored fruits, the taste and aroma depend a great deal upon the physical features as well as upon the methods of cultivation and preparation. Surinam coffee flavor is strong, bitter, and sour, and it has a rather unfortunate reputation on the world market. According to a planter, nothing is wrong with this Surinam coffee except the tastes of the people, and the author is inclined to agree upon this opinion. When first tried, the coffee seems very disagreeable, but gradually a taste is acquired for the beverage. Be that as it may, it is impossible, of course, to convert people to the use of Surinam coffee. Therefore, attempts have been undertaken to modify the flavor and appearance of the beans to make them more desirable upon the world market. Dr. D. S. Fernandes, Director of the Department of Agricultural-Economics, has developed a new process for preparing the coffee which removes much of the sour taste and changes the color of the beans from a yellow-brown to a bright-green state. Samples of the newly processed beans were sent to the United States importers, and comments were generally quite favorable, although a few concerns were not as yet highly impressed with the changes made by the "Fernandes System." Sample remarks from the importers follow:¹

¹ "Verslag 1936-1937, Landbouw-Economische Zaken, Suriname." Pages 106, 107.

Danemiller Coffee Company, New York

"It is certainly a very much improved product over the old shipments. If you can ship the coffee continually in the future you will have done your country a great economic good, in as much as your coffee will be in demand all over the United States."

Eppens, Smith Co., New York

"After roasting and cupping some very carefully we are sorry to advise you that in our opinion the new process has removed only a small portion of the unpleasant smell and some taste. The coffee has a very nice appearance in the green."

Sprague and Rhodes, New York

"It is our opinion that the experiments which you have made with this coffee have greatly improved the quality and it is our belief that with proper marketing would find a fair sale in this country."

In spite of this new process and the efforts of the planters and the government, the industry has been steadily declining. The chief reasons for failure are the low coffee prices and the lack of a market. Mr. J. D. Gomperts, manager and owner of Ma Retraite, estimated that the cost of producing a kilogram of coffee was twenty-five cents, and that the selling price in July of 1941 was only ten cent. Naturally, the estates are bound to fail under such conditions, and the government has attempted to offer aid by a valorization system of storing coffee, but this renders but temporary relief.

The war has eliminated the chief market, namely the Netherlands and Scandinavia. A small quota limits the shipments to the United States, and although this has been recently increased, Surinam cannot be a favored country at the expense of politically and economically more important Latin-American nations.

Coffee seems to be nearing the end of a second cycle in its history in Surinam. High hopes for success were held thirty years ago, and for some time the industry did well, but for the last decade it has suffered from a bad reputation on the world market, low prices, elimination of potential buyers, droughts (especially in 1940) and lack of sufficient labor. The government has decided that coffee is practically a lost cause, and aid to the planters

Sixty-eight

has been decreased, thereby accelerating the trend to estate abandonment. Jungle vines steadily engulfing the coffee trees are a common tragic sight in Surinam today, thus marking the end of another era in the economic history of the colony.

Production and Export of Coffee — 1935-1941*

Year	Production 1000 kg.	Export 1000 kg.	Export Guilders	Average Market Price Per kg. Cents	Chief Markets	% of Value
1935	4,344	4,479	898,468	20	Netherlands United States Norway	56 26 15
1936	3,328	4,027	686,944	17	Netherlands United States Norway	21 62 14
1937	3,434	2,493	529,132	21	Netherlands United States Norway	57 9 31
1938	1,767	2,784	465,858	16	Netherlands Norway Germany	67 23 7.6
1939	4,136	2,486	592,749	24	Netherlands United States Norway	52 23 18
1940						
1941						

* "Surinaamsch Verslag 1938 and 1939," Departement van Landbouw-Economische Zaken. Page 69.

Bananas

Due to the ravages of the witch-broom disease, the cacao industry was suffering a serious state of decline in 1905, and so the planters and the government of Surinam sought an alternative crop. A large-scale banana industry was therefore begun in 1906 when an agreement was made by the Surinam government with the United Fruit Company of America. The contact called for the planting of 7,000 acres in a period of three years, and all exportable bananas had to be sold to the Company. Planters were advanced money by the government in a system of subsidized agri-

Sixty-nine

culture, and the loans were to be redeemed out of the anticipated profits. The United Fruit Company agreed to buy all the fruit, which was to amount to 20,000 bunches a week, and to inaugurate a regular steamship service between Paramaribo and New York. No more than a thirty-six hour notice was to be required for the cutting and delivering Gros Michel bananas, which meant that only the really productive land near Paramaribo could be used, and that very efficient transportation and labor conditions were essential.

In Surinam, in contrast to Central America, bananas were planted on old sugar or cacao estates and not in virgin soil. The banana plantations were established under the supervision of the United Fruit Company more or less according to the Central American practices. A system of three-foot drains was constructed, and extensive agriculture was attempted.¹ However, it was found that more intensive work was required in Surinam, and this naturally increased the labor costs. In spite of more intensive cultivation methods, the yield per acre was only forty per cent of the Central American plantations.² This lower production was undoubtedly due to edaphic and climatic conditions. The soil was not ideal, being poor in drainage due to its heavy clay texture, and rainfall, although great, was not reliable, which meant that irrigation was necessary, but this was financially and physically impossible.

Export shipping of bunches illustrates the trend of the banana industry in the next few years.

1908	219,686 bunches
1909	646,017 "
1910	654,180 "
1911	387,516 "
1912	213,999 "
1913	136,978 "
1914	73,222 "

¹ "Tropical Agriculture," 1931. Agriculture in Surinam, by C. W. Wardlow. Page 33.

² Ibid. Page 34.



BRITISH-INDIAN GIRL FROM PARAMARIBO

Photo Philip H. Hiss

Extreme depression in the business was due almost entirely to the spread of the Panama disease. This disease spread rapidly after it was first noticed in 1906, and serious damage was done in 1908. Reasons for the unprecedented intensity of the havoc have not been explained fully, but it was undoubtedly due in part to the inadequate drainage, neglect of the fields, too close planting, and lack of scientific advice.

In desperation the government introduced in 1910 the Congo banana which was immune to the ravages of the Panama disease. The United Fruit Company decided that this type was not suitable for export to the United States because of the inferior market qualities and difficulties with shipping and storing. The contract between the Surinam government and the Fruit Company was therefore broken, and the colony was once again without an important agricultural export product.

Today, bananas and plantains are raised by small farmers for local consumption but not for export. An important part of the local food supply is obtained from this source.

Environmental conditions are not bad for the growth of bananas, and the temperatures and winds are particularly suitable. There are no tropical storms in Surinam, and the steady trade winds and sea breezes only tear the leaves of the plant. Average growing periods are from ten to fourteen months, and four harvests are obtained from a normal plant. The second cutting is the largest, and usually enormous bunches of fruit are obtained.

Experiments in recent years have been made under the supervision of the government agricultural station on virgin clay, sand, and old estate soils, with the hope of reestablishing banana plantations. However, the environmental conditions preclude any prosperity in banana exports, even if the marketing arrangements could be made. The lack of irrigation works to supplement the rainfall during the droughts, the high clay content of the soil, which makes drainage difficult, and the acid nature of the soil, which hastens the spread of the Panama disease, all contribute in creating a situation in the banana business which no large fruit

company is willing to face as long as there are more suitable areas in the rainy tropical lowlands of the world.

Cacao

At the beginning of the present century, cacao was the leading crop of Surinam, but today the production is practically nil. The tree, a native of equatorial America, found in Dutch Guiana physical conditions that were very suitable to its growth,—constantly high temperatures, the average being about 80 degrees F., heavy rainfall with high humidity, no high winds which would injure the pods or increase the evaporation of the ground water, a healthy growth of *Erythmia* to supply shade, and a fairly fertile lowland soil.

The periodic droughts and the non-porous nature of the soil were not ideal, but these factors did not handicap the industry greatly. The catastrophe which ruined the cacao plantations was the incident of the witch-broom disease and the disease known as "versteening," or hardening of the pods.

As at the present time in the coffee industry, financial difficulties of the estates led to a dilemma; the plantation managers lacked funds for employing adequate workers, and so the diseased trees were left unpruned, and naturally the infection spread rapidly. The government took action in order to save the industry, and spraying and drastic pruning of the trees was attempted. However, in spite of all the efforts to rejuvenate the cacao crop, the steady decline continued to the present insignificant position. The agricultural history of cacao in Surinam verifies the proposition that it is extremely difficult, if not impossible, to revive a depressed crop industry in a particular spot in the rainy tropical lowlands as long as there are so many other more suitable areas.

No cacao plantation may be found in Surinam today, and the very small production of the market is supplied by small landholders in the Nickerie and Sarramacca Districts. There has been no export of cacao in the last three years. The following table shows the average exports for previous years:

1916-1920	1,974,614 kg.
1921-1925	1,233,887 kg.
1926-1930	216,563 kg.
1931-1935	22,356 kg.
1936-1939	6,815 kg.

Rice

Rice is undoubtedly the outstanding agricultural product of Surinam at the present time. On this crop rests the hope for a more permanent prosperity for the colony, and from present indications the future looks bright.

The immigration of contract laborers from the Far East British Indians and Javanese, created a demand for rice. For a long time, this demand was satisfied by importation. However, in Surinam ideal physical conditions plus a working population skilled in rice cultivation led to the planting of paddies for local consumption. The annual import of rice decreased steadily from an average of thirteen million pounds in 1910 to 1912, to five and one-half million pounds in 1916¹ due to the ever increasing home production. Since then, the rice areas have expanded regularly so that today this agricultural product has the largest acreage of all crops, and in normal times offers an exportable surplus.

Rice growing is concentrated on the coastal region of Surinam where the land is very level so that no terraces are necessary. The high average temperature and the heavy annual rainfall throughout the year are very favorable factors. Fairly fertile and exceedingly dense impervious soil aids in the growth of the crops by permitting easy flooding of the fields without too rapid drainage. The annual dry seasons and the occasional drought years make imperative the development of irrigation systems. The Netherlands government has made plans for such projects, and some of the systems have already been completed. However, public works of this type demand large amounts of capital which are

¹ Report from the British Foreign Office. Page 47.

not available in a poverty-stricken colony, especially during a war period when the motherland is fighting for its life.

Nickerie, in the western coastal area of Surinam, is the great rice district. Here the mixed population of six thousand, with a high percentage of Asiatics, concentrates upon the production of this crop. The polder landscape, with waving fields of grain is a very picturesque sight, and it remains in the author's mind as an outstanding memory of Dutch enterprise in this tropical colony. The government has taken a very active part in the construction of polders and irrigation works. This governmental Public Works program began in 1915, and some private capital has contributed in reclaiming land for agriculture. At the present time, government construction under the direction of Irrigation Engineer J. van Wouw, is very active, and work is under way to add new polders and to dig an irrigation canal from the Nanni Creek to the agricultural fields.¹ The necessity for a good source of irrigation water was obvious after the disastrous drought year of 1940. Swamp water during a protracted dry season is inadequate and often unsuitable for irrigation. Therefore, the difficult and expensive task of excavating a canal was started in 1941 so that a good crop in 1942 would be assured. A polder building program continues, and the Clara Polder of approximately three thousand acres will be ready for planting in 1942. Plans for the future include new polders and another irrigation trench from the Nanni Creek. Due in part to these government projects, Nickerie produces usually about two-thirds of Surinam's rice for export.

Mechanical rice production has been attempted in Nickerie by a Dutchman, N. H. van Dijk. This experiment began in 1933 and was backed by a Netherlands government subsidy. The hope was that mechanization of rice would aid the economic status of Surinam and possibly encourage settlement by whites in the colony. Machinery was purchased, and a rice milling plant was built, but the project has failed at least in part. The heavy wet clay soils plus the great number of ditches made the use of ma-

¹ This canal has now been completed. Ed. Note.

chinery impractical. The tractors sank in the mud, and the expense of preparing the fields in this manner proved greater than by using East Indian hand labor. The whole project, however, was not completely in vain, because the modern rice milling plant of van Dijk is a definite asset to the District, and the publicity given to rice by the experiment has greatly increased its prestige in the colony. However, the old tested methods of cultivation of rice by hand still apply even in van Dijk's stronghold.

Land tenure in Nickerie shows interesting variations. Two systems of holding land prevail; one, Waterschap which comes from the Netherlands directly; the other, Dorpsgemeente by way of Java. Waterschap had its origin in early Dutch history, and at that time it regulated all the affairs of the government. Dorpsgemeente came into use in Holland at the time of the French Revolution. In theory, Dorpsgemeente does not have such wide powers as the Waterschap. In Surinam, and especially in the Nickerie District, both systems of land tenure are in operation. The early governors from Holland established the Waterschap method of land holding, and Governor Kielstra introduced the Dorpsgemeente. The chief differences in practice between the two methods is that the Waterschap applies to land owned by individuals or held on long lease terms. A short lease holding, with the government taking an active part in supervising and maintaining property, is a Dorpsgemeente. The following table shows a list of polders in the Nickerie District and denotes the type of land holding of each:

<i>Name of polder</i>	<i>No. of acres</i>	<i>Land tenure</i>
Clara	3,600	In construction
Corantyne	2,750	Waterschap
Van Drimmelen	2,250	Waterschap
Margaretenburg	2,000	Dorpsgemeente
Waldeck	2,000	Dorpsgemeente
Sitozedjo	2,000	Dorpsgemeente
Paradise	1,750	Dorpsgemeente
Longmay	1,000	Dorpsgemeente

<i>Name of polder</i>	<i>No. of acres</i>	<i>Land tenure</i>
Boonacker	425	Waterschap
Sawmillkreek	1,375	Waterschap
Hamptoncourt	2,350	Waterschap

The Nickerie rice district is unique in many ways, and a series of maps have been prepared to picture the location at the junction of the Nickerie and the Corantyne Rivers the arrangement with drainage and irrigation trenches the land utilization as related to the landforms. As explained and illustrated in Chapter III, the coastline is steadily sinking, and old landmarks are now under seawater. The drainage trenches lead to the master sluice-gate which opens at low tide to permit an outflow of water. At high tide, the gate closes, and the dykes shut out the sea. Land is very flat, but occasionally low ridges of sand may be noted. On these former beaches, dry crops should be planted, because rice does not thrive unless there is a good covering of water. However, there is not too close correlation between dry land and dry crop plantings. The natives attempt to plant rice everywhere and refuse to listen to advice given by the agricultural expert, H. L. Schutz. The high land planters quarrel with their neighbors, because not enough water is available for a flooding of their rice fields. The great cooperative spirit shown by the Dutch in Holland in their fight against the sea is not easily transmitted to a hybrid population. The irrigation trenches are not cleared of weeds and plants by the workers; consequently the task of pumping is made more difficult. One man refuses to clear his section of the canal, because his neighbor has not done his share. Supervisors must watch the canals constantly so that a farmer will not throw up an earthen dam across the irrigation ditch in order that the individual field will receive an abundant supply of water. Negroes, Indians, and Javanese bicker over such items, and the Dutch officials must be the judges and peacemakers, because committees of natives fail to settle difficulties.

Even though the rice is being cultivated with success, there is little chance that the crops will be the financial salvation of Sur-

inam. The crop is bulky and does not have high value per unit weight. This is an important liability in a land where transportation is so poor. Freight rates are high, and the product is not worth much on the world market. Surinam rice also is characterized by high breakage (60 per cent in Nickerie) which means that a great deal of it could not be classed as first quality. The trade barriers of the British Empire, Venezuela, and other countries restrict the market considerably. Consequently, with the fall of France in June, 1940, the rice exports went chiefly to the French colonies of Martinique, Guadeloupe, and Guiana. In 1940, there was no export due to the drought, but in 1941 the problem was to find an outlet for surplus rice. Trinidad was a possible market because of a rice shortage in its rapidly growing population. The occupation by American troops meant that a new local market had developed.

The chief problems of the rice industry appear to be the following:

- I. Unreliable rainfall makes necessary the building of irrigation canals from a fresh water source. The East-West flowing streams provide better sources of such water than the South-North rivers, because they are usually farther away from the sea and its tidal influence. Swamps can be used only after rainy seasons when irrigation is not needed. During the dry seasons, the high acidity of swamp water is injurious to rice plants.
- II. Polders must be built and repaired in order to increase the acreage in rice. This, like irrigation, needs capital.
- III. Good sowing seed is essential, and the government Agricultural Station aids in the program of improving types.
- IV. Better milling methods are urgently required. There are only two modern plants in all of Surinam—one at Waterland, and the other at Nickerie. The native milling does not produce a good quality, because the breakage becomes very high.

- V. New markets must be developed to replace the French colonies and to provide for increasing exports. There has been too little activity of looking for and acquiring markets.

Coconuts

The coconut palm is one of the most valuable trees of the tropics, and it plays an indispensable part in the life of the people of Coronie in Surinam, the town built on sand and shell ridges. The tree yields many diversified products, and to the native it is a source of food, drink, shelter, utensils, and cash money. The trunk is used for wood for houses and tools; the leaves for thatching roofs and basket making; the sap for concocting a very potent wine; the shell for utensils or for being converted into charcoal which is now needed as a filter in gas masks; the milk is used as a drink; the fibers of the outer shell are used as a coarse rope-making material (coir); the meat of the nut is used for food; and the oil is of great economic importance in the manufacture of margarine and soap.

Coronie has excellent conditions for the growth of the coco palm. Continuous high temperatures, a good deal of sunshine, high humidity, the average rainfall of 72 inches, and the loose sandy soils, all are favorable to the tree. Consequently, the population, largely Creole, lives on a coconut-rice-pig economy. Bees, obtaining honey from mangroves, furnish a good cash crop. The long and narrow village is a tropical paradise with thousands of palm trees, rice polders, fanned by the fresh sea breeze, rooting pigs, and barking dogs. Life is very easily enjoyed, and the natives loaf most of the time still managing to eat regularly. The possibilities for greater rice production are many, but in the minds of the Creole a steadfast resolve remains; "Why should I work in my fields of rice when the crop of three years ago still supplies me?" The coconut trees provide him with the necessities of life, so the Negro prefers to enjoy his pleasant existence sitting in the shade.

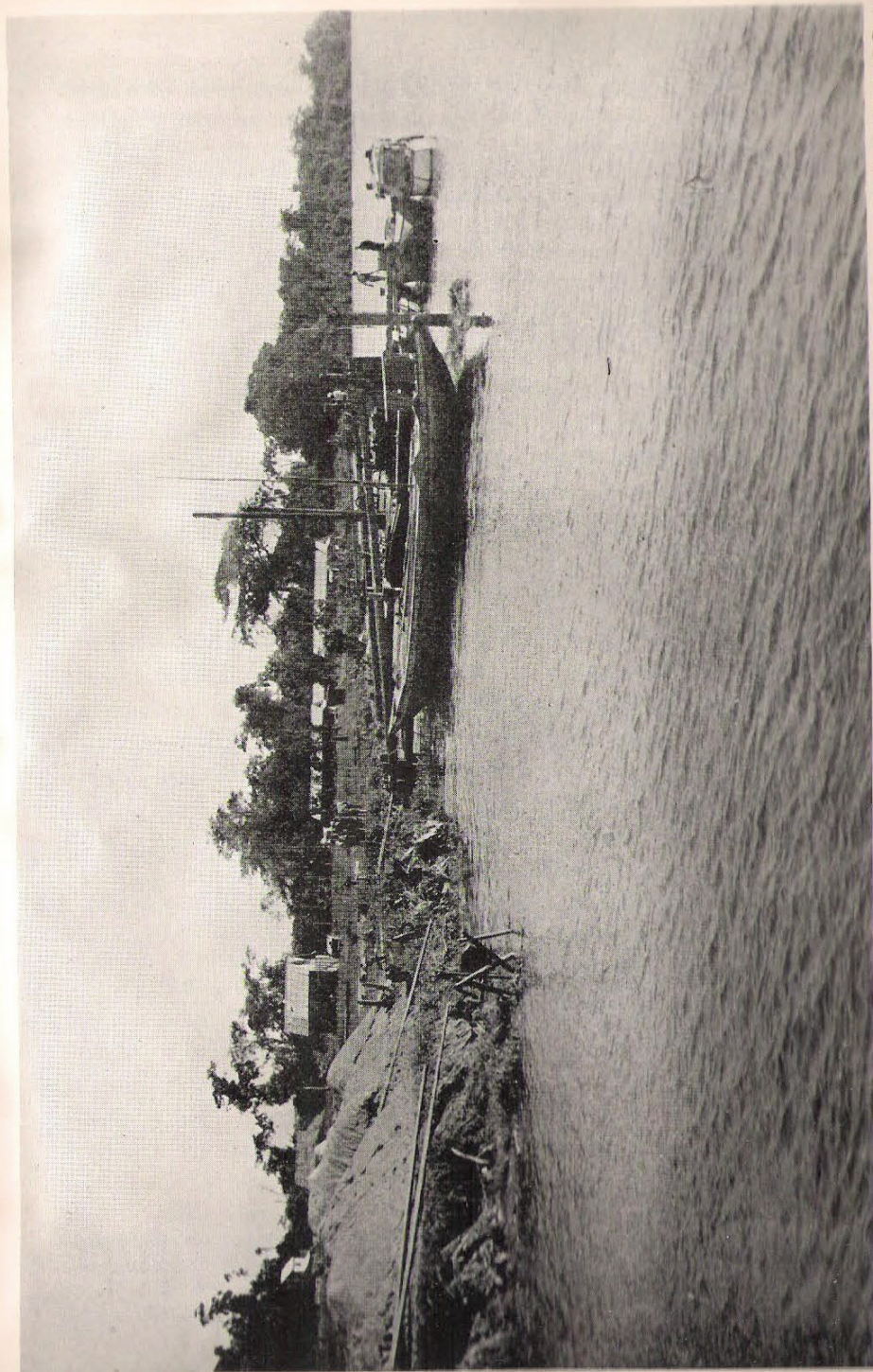
The coconuts are grown on small plots by the Creoles and located on the sand ridges. These higher areas are then covered completely with palms, and the low lying clay lands between are poldered, being very suitable for the growth of rice. After planting, the coco palms begin to bear within seven or eight years and may continue producing for sixty years or more. Coronie Negroes have found a more permanent economy than the nineteenth century Scottish settlers and their cotton estates. It was these Scottish people who founded the town. Scotch names still are prevalent in the district, Burnside, Hope, Friendship, Hamilton, etc., all being names of former settlements.

Coconut oil is the major commercial product of Coronie Creoles. This oil is prepared by a variety of methods, some being extremely primitive. The coconut meat is grated by a crude rasping machine; then the meat and oil are boiled in huge containers in order to evaporate the water. A more modern method is practiced also by drying the coconut meat in an oven. This resulting dried product, copra, is then pressed in a machine, and the valuable oil is extracted. Poonac, the cake left after the oil is obtained, makes an excellent food for livestock. The same machinery is used for pressing peanuts for oil. Peanuts, however, are not grown in Coronie, but are brought in from other districts. Experimental peanut fields have not been a success in Coronie. Peanut oil pressing does not yield great profits, but the peanut cakes furnish the necessary food for animals.

The animal industry of Coronie is an important response to the coconut production. Pigs and cattle are raised for the local food supply and also for the supply of other regions in Surinam. In 1941, twenty-six hundred pigs were shipped to the Paramaribo market.

The importance of coco palm is rapidly increasing during this World War II. Some of the uses of these trees are vital: oil for margarine as a replacement of animal fat; oil for soap; charcoal for gas masks. The Philippines and the Netherlands East Indies together produce a large share of the world's commercial supply

Eighty



of these items. Japanese acquisition of these lands adds new importance to the little town of Coronie in the eyes of allied economic strategists.

Citrus Fruits

The citrus fruit industry is relatively new in Surinam. Possibilities seemed very bright a few years ago, but the war has delivered a crushing blow to the high hopes for a successful agricultural export of oranges, lemons, limes, and grapefruit.

Originally, the home of the citrus trees was the rainy tropics. Optimum temperature conditions lie between 68 and 86 degrees Fahrenheit, and 75 to 95 inches of rainfall are considered ideal.¹ The climate of Surinam excellently fulfills these climatic requirements, and therefore the citrus trees do very well. The Guiana region has many advantages that Florida and California lack, but it also has its disadvantages.

One great asset of the citrus growing in Surinam is freedom from frost danger. Many citrus areas in the United States are climatically marginal, and this is due to the desire to be closer to the great markets in the temperate lands. However, a price must be paid for expanding the industry into higher latitudes. Frosts may destroy a valuable crop or even the trees themselves. Even though no damage may be done over a period of years, the expense of frost protection devices—windbreaks and heaters, must be met. In Surinam, the high annual temperatures make such expenditure unnecessary.

Inadequate rainfall in the American citrus regions makes irrigation imperative. The cost of building these irrigation works is great, and this is another problem naturally avoided in rainy Dutch Guiana. An irrigation system might be useful, however, especially in the drought years such as the one of 1940. Other handicaps such as those of hot dry winds and excessively alkaline soils are likewise not present.

¹ "Influences of Climate on the Cultivation of Citrus Fruits," by Edward Ackerman. *Geographical Review*, 1935, Pages 289 and 296.

Surinam citrus fruits, particularly oranges, are juicier and have a finer taste than the American oranges. The higher relative humidity favorably affects the juiciness and the flavor.

But then, the disadvantages of the citrus industry are many, and the physical handicaps have been reinforced by economic and political difficulties.

Poorly drained, heavy clay soil is conducive to root rot. This problem has been more or less solved by planting rot-resistant sour orange saplings with sweet orange tops.

The appearance of the fruit is not very favorable. The color of the orange is a whitish green yellow, and the fruit is often blemished.

Fungi problems are great due to the heavy rainfall and high humidity. Citrus scab, canker, sooty blotch, and others are traced to the very humid conditions.

Decay of fruit in transit is a major problem in all moist regions. Losses in transit of Florida oranges is greater than the California fruit, even though Florida is three times nearer the market than California.¹ Surinam's location far from a market, with a hot and moist climate, make the danger of fruit spoilage even greater.

Lack of adequate shipping facilities is once again a barrier to a successful agricultural export.

Small-scale operation is a decided liability. A large consumer is not interested in "sample" quantities of citrus fruits. More capital is needed for the industry, but money is not attracted by a failing small business.

The war has closed the European market for the Surinam citrus fruits. Orchards had the appearance of stark tragedy in the summer of 1941, with their uncut underbrush slowly stifling the trees.

The future of the citrus industry in Surinam may not be so dark. Good fruit can be produced at extremely low costs. With

¹ *Geographical Review*. Ackerman. *op. cit.* Page 302.

improvements in transporation because of bauxite shipments, new markets may develop. The United States could obtain a good and cheap supply of citrus fruits from Surinam, and if a relatively small amount were imported, the colony would benefit greatly.

Animal Industry

The animal industry struggles on under numerous environmental handicaps, but in spite of all difficulties, there has been a steady increase in the animal population. Owing to this rise in domestic animal production the usual meat importation has decreased as a result.

The chief disadvantages of the cattle industry are:

1. Tropical diseases such as ticks give the cattle Texas Fever, hoof and mouth disease, Anthrax, tuberculosis, and others. There are no dipping tanks for controlling these ticks, and only some unsatisfactory spraying is practiced.
2. Forage lacks proteins and mineral salts. The grasses are not so nutritious as the temperate grasses, and they are harsh and tough due to the high content of silica.
3. The cattle are of poor quality. They have heavy frames and are difficult to fatten. Attempts have been made to improve their type, but imported European bulls die very rapidly. West Indian Zebu bulls bred with native cows produce a line which is more immune from Texas Fever but which has the undesirable hump characteristic of their kind.
4. Poor transporation and slaughtering facilities: The government slaughter-house handles all the meat for Paramaribo, but there is the shocking situation of no refrigeration for storage of meat.
5. Market for meat is rather small. The Javanese and British Indians eat very little meat in their diet.

Pigs are rapidly becoming more important in the meat market. In the chapter on coconuts is explained already the situation.

Coronie is the center of the pig industry, and there the animals serve as scavengers.

A close correlation may be noted between the increase of British Indian population and the increase of cattle. The Hindus do very well with the raising of cattle, although they do not care to kill them. The Dutch cattle raisers outside of Paramaribo do not seem to be able to stand the competition of these British Indians. An accurate correlation of increase in all animals, cattle and pigs, along with greater rice production may also be noted. More draft animals are needed with the increasing rice polders being constructed, and in time more feed will then be provided.

Salt and smoked meat supplies are imported chiefly from Argentina, but because of shipping difficulties during this war, imports of the meat have been greatly reduced. Consequently, salting and smoking of meat has been begun by Dr. Frickers and his staff.

The dairy industry is very poorly developed. Poor type cows yield an average of only three litres of milk a day. Sanitation rules do not exist in Surinam, and the milk must be boiled in order to remove the probable germs it must contain. The cost of collecting the milk is high because of the very meager production per farmer. The Kersten Company is now trying butter making, and natives are paid five to six cents a litre for milk by this concern. Most of the butter used by the population is imported in tins from Brazil.

The price of milk has remained about the same the past few years, but the meat prices have risen considerably. In 1941, milk was ten to twelve cents per litre, and eight to ten cents from the East Indians. In 1938, beef, living weight per pound, was twelve to sixteen cents a pound; in 1941, it was twenty-four to twenty-six cents. In 1938, pork, in living weight per pound, was twenty-five cents; in 1941 it was forty cents.

CHAPTER V

Economic Geography

Bauxite

Aluminum has become a metal of tremendous military importance in the present war, especially for the construction of planes, but also for countless other uses. The metal has numerous properties that make it desirable for use in industry. Among them are lightness (being only one-third of the specific weight of iron), resistance to corrosion, high thermal conductivity, ductility, excellent tensile strength for its weight, and abrasive qualities. Although aluminum has been used commercially only since the late nineteenth century, it is considered today an all important industrial material. Because of the insufficiency of supply in the United States, aluminum was one of the first commodities to have imposed upon it a mandatory priority control. Early in 1941, this metal was placed on the critical list by the Priorities Division of the Office of Production Management when it became evident that there would not be enough aluminum for defense needs and civilian requirements as well. This meant that the army and navy Munitions Board could issue preference ratings.¹ In order to relieve the shortage somewhat, a campaign to collect old aluminum-ware from the civilian population was carried out in the summer of 1941. Under such circumstances as these, it is almost impossible to exaggerate the importance of Surinam to the United States, a land that supplies approximately sixty per cent of our aluminum ore.

Aluminum is the most abundant metallic element of the earth's crust (8 per cent). It is an important constituent of most common rocks except sandstone and limestone. Unfortunately, there are

¹ Commodity Yearbook, 1941. Page 63.

only a relatively few places where economical mining is possible under present methods.

Aluminum is obtained from bauxite, a weathered rock material. There is no universally accepted scientific definition of bauxite, but the term is widely used to indicate various aluminum ores, consisting mainly of hydrated aluminum oxides. Bauxite is made up of aluminum oxide combined chemically with water in the form of a monohydrate or trihydrate, and associated with it are varying amounts of impurities such as ferric oxide, silica, and titanium oxide.¹

The origin of bauxite has been a much disputed question, and three main hypotheses have been advanced: (1) chemical sedimentation; (2) weathering in situ; (3) detrital deposition.² In Surinam there seems to be little doubt that severe weathering or laterization of rock materials has been the cause. It is natural that the more soluble constituents such as lime and alkalis would be eliminated first in a weathering process leaving relatively insoluble materials, alumina, iron, and titanium oxides.

Surinam bauxite deposits are of two types, the Lowland and the Highland. The Lowland deposits are exploited commercially, and they are found in low, flat-topped hills. These hills are comparatively small in area, their height being usually less than one hundred feet. The Highland type is located at Brownsberg, at an elevation of four hundred fifty feet. One suggestion is that bauxite originates in tropical climates on former peneplain or base-leveled surfaces.³ The situation in Surinam ties in very well with such a theory. Although the Lowland deposits are on smaller elevations, the flat-topped deposits indicate a close physical history. These small hills may very likely be erosional remains of a former widespread peneplain.

The commercially important deposits of Surinam are located in a five mile belt, twenty to thirty miles from the coast.

¹ Bauxite, by Lawrence Litchfield, Jr. Part 1. Page 2.

² Aluminum Industry, Edwards, Fray, and Jeffries. Page 86.

³ Ibid. Page 102.

The Moengo Plant

Bauxite was discovered in Surinam in 1915, but no shipments were made until 1922 when Moengo started operations. The "Suriname Bauxiet Maatschappij," a subsidiary of the Aluminum Company of America, developed this plant on the Cottica River, more than one hundred miles from the sea. The town may be reached only by boat from Paramaribo, sailing on the Suriname, Commewyne, and Cottica Rivers. The last of these three rivers narrows to less than one hundred feet near Moengo.

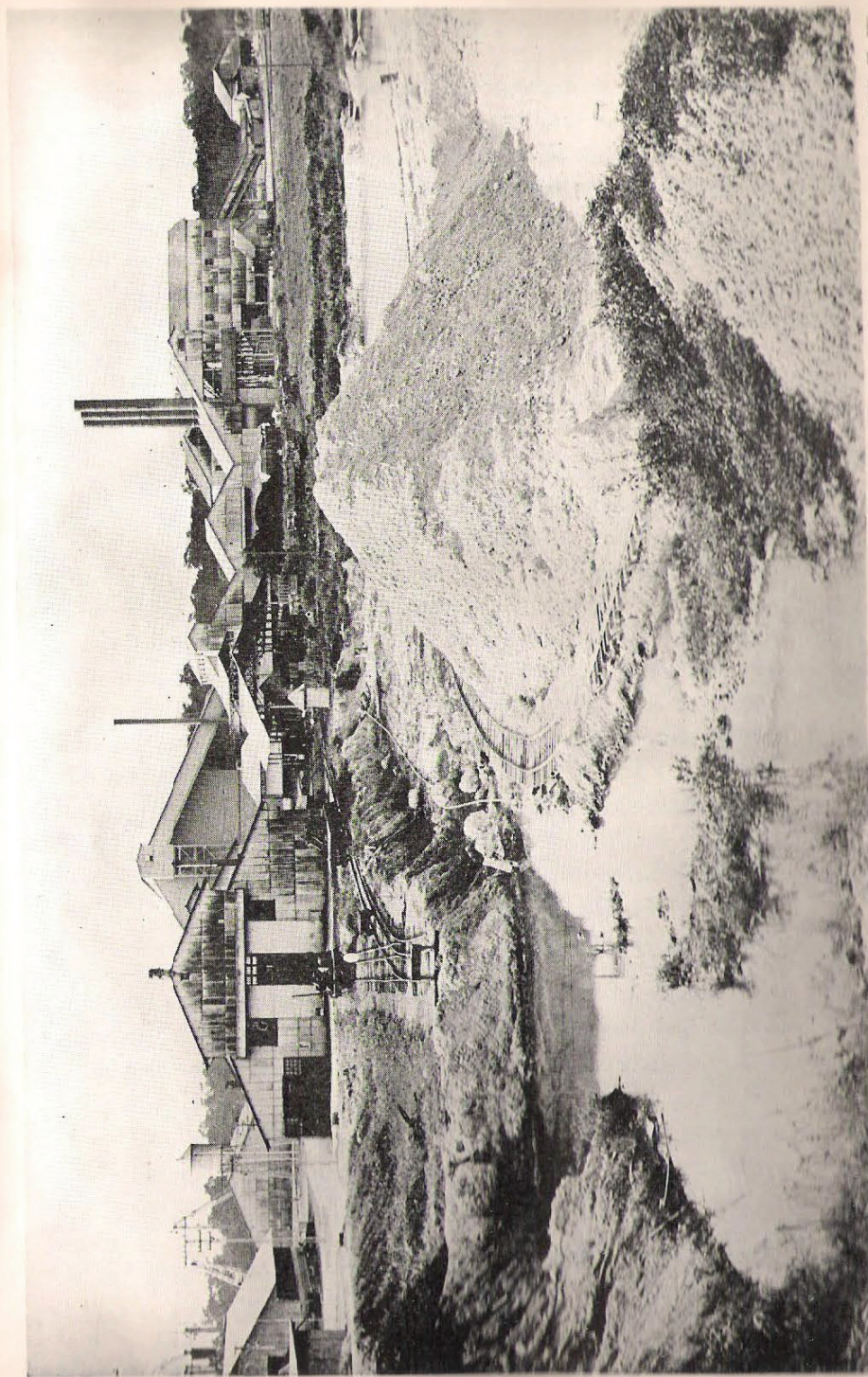
The bauxite ore body extends for about five kilometers with the thickness of the layer varying from two to twenty-four feet, and the average depth ten and one-half feet. Underlying this is kaolin clay which may be quite easily confused with the light colored fine textural bauxite. The color of the ore varies from a greyish white and pink to a reddish brown, depending upon the amount of iron oxide content. At the point of contact between the kaolin and the bauxite pipes or tubes of gibbsite (white bauxite), penetrate downward into the clay, and round gibbsite concretions are also found here. This is additional evidence in support of the origin by weathering.

The bauxite has the following average composition: Al_2O_3 — 59%; SiO_2 — 2%; Fe_2O_3 — 6½%; TiO_2 — 2½%; and combined water — 30%.¹

There are two main types of ore: (1) white or chemical which has less than 2 per cent iron oxide, and is therefore a very high grade of bauxite; (2) metal or regular ore with a higher iron oxide content. Some white bauxite for chemical manufacture is shipped, but the bulk of the production is the regular ore.

Fortunately, the bauxite is located at the surface with little or no overburden. The open pit method of mining is used, and there is only one level for operation. The first task which must be

¹ Edwards, *op. cit.* Page 110.



completed before mining begins is the clearing of the dense forest growth. This is difficult, because the wet, green wood does not burn easily. After clearing, any soil overburden must be stripped. This work is done by hand, but fortunately much of the bauxite lies exposed at the surface. There is no danger of ever approaching the economic limit of stripping—three yards of overburden to one of bauxite.¹

The Moengo bauxite is hard and compact; it is necessary to drill and blast it. After the ore is shattered, it is loaded into small mine cars by Diesel shovels. The ore is then carried to the mill where it is crushed, passed over rake classifiers and screens to eliminate the highly silicious fine material. Large boulders are almost pure bauxite. Then it is washed to remove silica and to cut down the dust, after which it is dried by passing through long cylindrical drying kilns which are fired with fuel oil. There are three of these kilns at the Moengo plant; two of them are in constant operation; the other is held as a spare in case of breakdown. The purpose of this drying is to save transportation costs on moisture. The ore is now ready for shipment, going to the huge storage building. Ships may be loaded directly by a chute from storage at a rate of six hundred tons an hour. Alcoa freighters of maximum size of 5,500 tons and 18 feet draught load the ore and carry it to transshipment points at Trinidad or St. Thomas, or carry it directly to New Orleans, Mobile, or Newport News. A ship is now loaded almost every day because of the greatly speeded up production.

Moengo, with a total population of fifteen hundred, is a unique town in Surinam. It has the appearance of an "American" settlement, although only one American, the machine shop foreman, lives there. Houses are modern, excellent water supply is available, a fine hospital cares for the few cases of illness, and the whole town wears the cloak of efficient management that is lacking in most other districts of the country.

¹ Bureau of Mines Bulletin, 1929. Page 298.

Labor supply in Moengo is excellent. Production figures of the plant are testimonials to the high quality of the workers and the management under I. R. de Greve, M. E., Managing Director of the Surinam Bauxiet Maatschappij, Mr. Toot, Acting Manager of the Moengo Plant. In 1941 there were approximately six hundred and fifty employees, and of this working population, Creoles numbered four hundred and fifty, Javanese two hundred. The laborers have been carefully selected over a long period of years, and they are skilled in their jobs. Creoles are good workers but need close supervision; the Javanese are steady but slow. Usually the Javanese are given jobs such as stripping, while Negroes make good machine operators. There are only a handful of British Indians at Moengo, but one of these has risen to the position of Mine Foreman. Trouble-making characteristics of many of the British Indians has undoubtedly influenced the choice of laborers.

The usual wage for native workers is thirty cents per hour (Dutch cents).¹ Drillers and strippers of the overburden are paid by the job. Laborers work about eight and one-half hours a day, and in the mine where operations continue constantly, there are three shifts. In the mill there are only two shifts of twenty-five men each. Although the wage is much higher than that paid on plantations, the workers are still not overpaid. Living expenses are thirty-five per cent higher in Moengo than in Paramaribo, and many of the families of the mill workers live in the latter city. This is the thing for them to do if possible, because there the schools are better, and the social life more pleasant. Very little labor trouble occurs in Moengo, although in August, 1941, there was a strike for higher wages, which was quickly settled.

The Moengo Mill was designed to handle seventy-five tons of bauxite per hour, but due to the increased demands, about twice that amount was rushed through the plant. However, this stepped-up production decreases the quality of the bauxite because of the improper screening and the mill machinery deterior-

¹ Since the war wages have become much higher. *Ibid.* Note.

ates much more rapidly. In July, 1941, the mine was producing at a rate of one hundred and fifty tons per hour. The output for July of 1941 was sixty-two thousand tons as compared with the fifty-seven thousand tons of June. The estimated production for the year 1941 was six hundred fifty-thousand tons. The management estimates that at this rate of production, the present ore body will be exhausted in three years. Yet, there are other ore deposits in the vicinity; one hill that has been prospected will probably yield a thirty to forty years supply. The amount of bauxite reserves seems to be virtually unlimited. As long as shipping routes are maintained, there seems to be little danger of a shortage in the United States.

Moengo Bauxite Figures

Year	Bauxite Shipment	
	Tons	No. of Workers
1928	202,500	690
1929	200,000	810
1930	257,000	760
1936	235,000	400
1939	505,000	580
1940	615,000	612

The Paranam Plant

The Aluminum Company of America subsidiary is also operating a new plant at Paranam on the Surinam River, about twenty-five miles south of Paramaribo. Mining started in the early part of 1941, but in August the concern was still far from being a smooth working unit.

The quantity of bauxite is not so great here as at Moengo, but the quality is good. Paranam's ore deposit hill extends for two and one-half kilometers by five hundred meters, and is located approximately five kilometers inland from the mill. Available aluminum in this bauxite averages fifty-five per cent.

Problems in economic geography have been difficult to solve in this new plant. The plant capacity is ninety thousand tons per

month; yet in July, 1941, only forty-eight thousand tons were produced. In spite of all the modern machinery and equipment at Paranam, it was outproduced by Moengo in July by fourteen thousand tons. Reasons for the situation were as follows: (1) American officials did not appreciate local problems such as the abrasiveness of Surinam ore; consequently one of the two kilns was soon out of operation. (2) Labor supply was not so good as that at Moengo. The seven hundred laborers worked in two twelve hour shifts at hourly wages of twenty-five cents. Much loafing was evident at Paranam. At the same time, the supervision by American overseers was not too efficient. (3) At Paranam there is no settlement of a town; most of the workers commute from Paramaribo. This housing situation is a serious one, because lumber can not be imported. Supply of building materials is largely in the hands of the Djukas; a modern bauxite concern can ill afford to wait for the Bush Negroes. When the Djuka difficulty is rectified, and other problems settled, Paranam will replace Moengo as the chief producer of Surinam bauxite.

The Billiton Company

This Dutch concern, the Billiton Company, which operates mines in the East Indies has started a development next to Paranam. The ore that is to be mined is of high quality (white bauxite), but the land is low, and much overburden must be stripped. Problems of drainage will also be difficult to solve. Billiton does not plan to build kilns (a plant's most expensive item), and the bauxite will be shipped directly to the United States without drying. This plant will be ready for operation in the early part of 1942.¹

Gold Mining

During the early colonial period, high hopes were held for finding the "El Dorado" in Surinam, but the first discovery of gold had to wait until 1860. The industry started very slowly; in 1875 exports amounted to only seventy-nine ounces of gold. This busi-

¹ This plant is already exporting at present. Ed. Note.

ness continued to grow, nevertheless, until the peak of production was achieved in 1908 when thirty-eight thousand eight hundred ninety-five ounces were mined and valued at about one-half million dollars.¹ Since that time, the industry has declined, but even to day the gold exports of Surinam rank second only to bauxite.

Gold is mined chiefly by placer washing on a small-scale basis. The metal is found in the alluvial deposits of stream valleys, usually in clay. This clay is washed in wooden boxes known as "sluices" or "toms" in order to separate the gold from the mass of material. The operators of these small mining concerns are called "pork knockers," and they were able to continue their operations because of low costs, while larger companies would fail. However, small capital backing of the "pork knockers" causes much difficulty in the time of stress. Many of them have too little capital to carry them through the bad years.

A number of large companies have been formed in the past for the purpose of exploiting gold deposits. One after the other, these concerns have failed. Elaborate equipment for excavating, ore crushing, and dredging, have been purchased, but much of this expensive machinery lies unused and rusting in the back country. These gold mining companies went into bankruptcy because of over-capitalization and excessive purchase price, poor management and labor, expensive transportation, and unsuitability of mechanical working of gold in Surinam.²

Transportation costs and difficulties are serious liabilities. The railroad rate from the gold field at Placer to Paramaribo, a distance of eighty miles, is sixty guilders a ton, which is more than from Paramaribo to the Netherlands. A great margin of profit is needed to meet the exorbitant transport charges. River travel is difficult, because the gold fields are located above the rapids.

The future of Surinam gold mining does not appear too bright, because of its numerous handicaps; the nature of the deposits;

¹ British Foreign Office, Dutch Guiana. Page 55.

² British Foreign Office, *op. cit.* Page 56.



LOADING SLUICE AT MOENGO PLANT

small-scale operations; poor management and labor; slow and expensive transportation; hot and humid climate; dense vegetation cover; lack of scientific prospecting. These all contribute to the dying of the industry. Under these conditions, no great progress can be expected. Yet, a sensational new discovery might transform the picture completely.

Gold mining is now under strict government supervision. No figures have been officially released since 1939. There has been a slight increase in production during the past few years.

Production Chart

Year	Grams	Value Guilders
1935	352,730	551,332
1936	433,487	694,205
1937	396,766	743,765
1938	440,231	839,364
1939	460,715	606,882

Markets for the gold in 1939 were:

Country	Grams	Value Guilders
Netherlands	265,450	467,193
England	6,934	12,203
United States	72,285	127,222
Curaçao	150	264

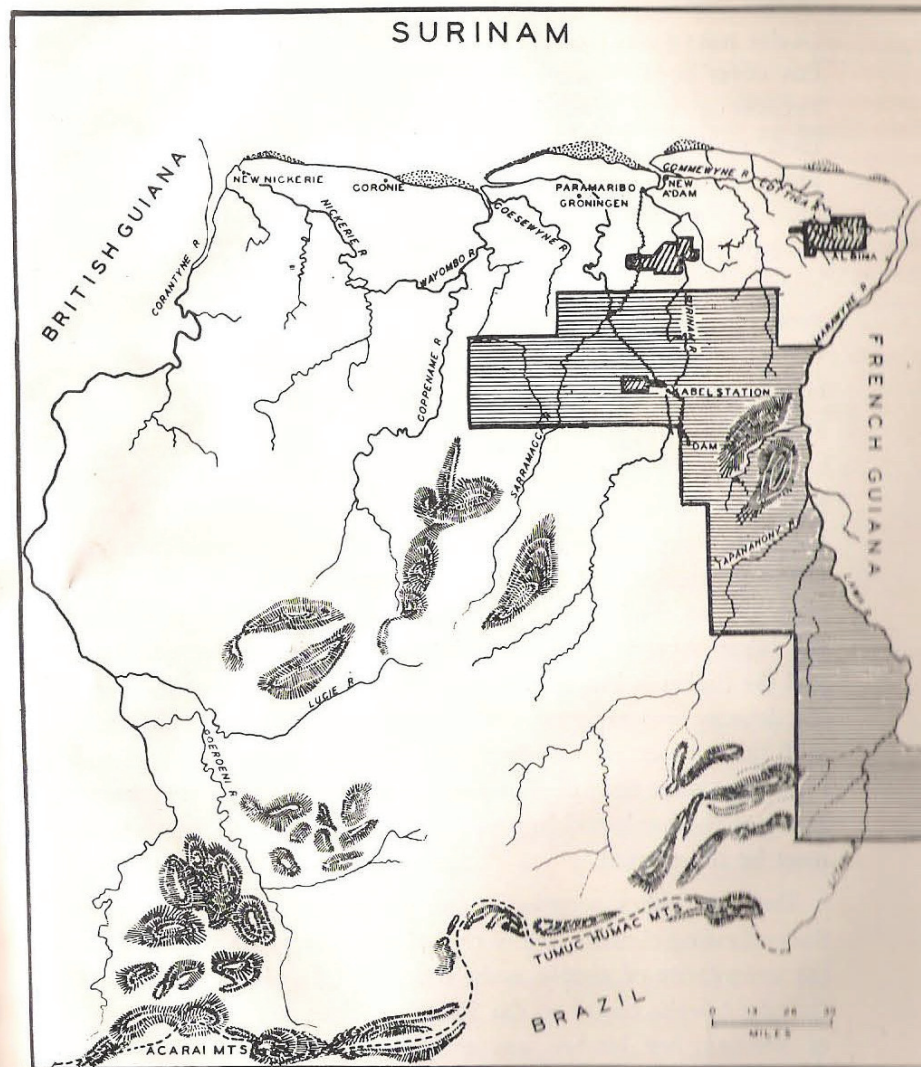
Forest Resources

Forestry is an important industry in Surinam, and the high value of balata and timber exports in relation to agricultural shipments is noteworthy. (See Page 104.) The consequent lack of shipping during the present war is adversely affecting the business.

The exploitation of Surinam's vast tropical rain forest has scarcely begun. Great reserves have not yet been touched and probably in the future lumber and balata will assume far greater importance than at the present time.

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CONCESSIONS of GOLD AND BAUXITE



MAP III

Lumbering

A great variety of species of trees characterizes the tropical rain forest, thus introducing a definite problem in Surinam. Only certain woods are considered marketable. Therefore, only particular trees are cut, and the majority left standing. The industry can never be very profitable as long as the bulk of the forest remains unused. In the Philippines where a similar complexity of forest growth is found, successful lumbering operations have been practiced. Here, in Surinam, on a certain concession, twenty-five hundred to three thousand tree species were found, but twenty, most of them not popular in the market, constituted eighty per cent of the stand.¹ Before the tropical rain forests can be worked profitably, the buying public must be educated to use a wider variety of woods. The method in Surinam of hunting for and cutting the widely scattered resistant hardwoods is too difficult and expensive.

Among the most important woods are brownheart, locus or Surinam teak, cedar, mahogany, greenheart, purpleheart, mora, and letterwood. Many of these types have good reputation on the world market, but two important handicaps have checked the expansion of the business: (1) Bush Negroes nearly monopolize the labor supply. These workers are completely irresponsible, and the timber is brought in months or even years after the time for delivery was expected. No foreign market can be cultivated with this type of erratic labor. (2) Transportation is very primitive. Logs must be hauled to rivers and then floated downstream. Many of the hardwood logs sink. Therefore, rafts of light wood must be constructed.

There are other geographic and economic difficulties such as the enervating climate, lack of capital, etc., but at the present time the irregularity of supply is the outstanding problem. Paranam, the new bauxite center on the Suriname River, was badly in need of housing, but lumber was unattainable. Valuable time was wasted waiting for a local supply while cheaper and easier worked

¹ Elements of Geography, Finch and Trewartha. Page 673.

lumber could have been obtained in the United States. Native woods are undoubtedly better, however, due to superior resistant qualities to moisture and insects.

Balata

Balata, a rubber-like gum obtained from tapping the balata or bully-tree, is much in demand on the world market because of its superior qualities as an insulating material. The trees are not grown on plantations, but they are found scattered through the forest. Balata industry therefore suffers many similar problems of the wild rubber collection in Brazil. Poor labor supply and inadequate transportation facilities are outstanding handicaps. A very serious problem is the lack of supervision in the forests concerning the manner of bleeding the trees. Many trees have been killed by unwise bleeding practices. Under present conditions, there is but little chance of great expansion of balata industry in Surinam's near future.

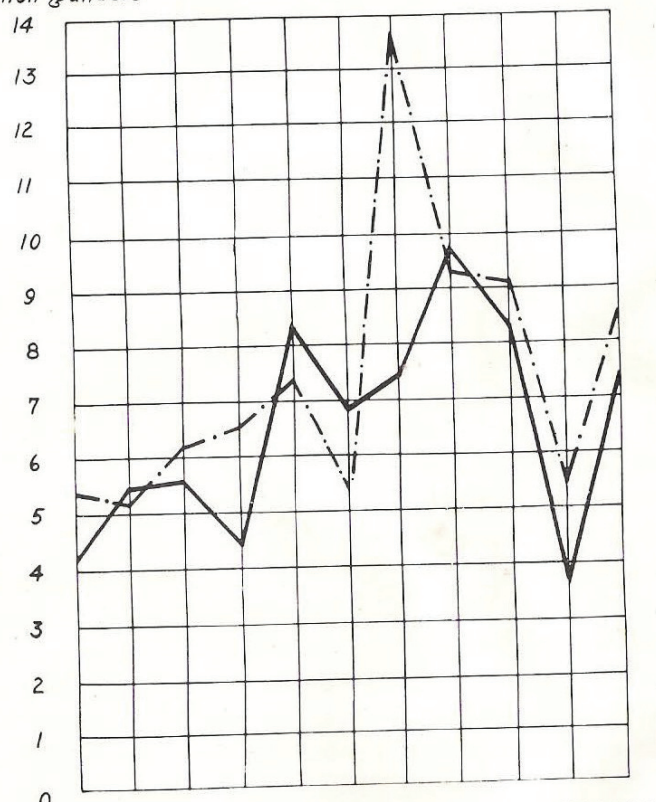
Trade

A study of the Surinam trade during the past few years shows interesting geographic and economic influences. The colony usually has had an unfavorable balance of trade with imports quite consistently exceeding the exports. A high percentage of the trade has been with distant western Europe and North America, because lands surrounding Surinam produce similar goods. Raw material producers naturally connect themselves with complementary industrial regions. However, Surinam's out-of-the-way location is a very definite handicap, as it lies ten days from New York and fifteen days from Amsterdam. Moreover, it is off the main trade route lines, and so it requires special steamship service which is naturally more expensive.

Chapter II reviewed the former high value of trade. In the nineteenth century there were two important events, besides the emancipation of the slaves, which injured the trade of the colony. Rise of the beet sugar industry and the construction of the Suez Canal were death blows to Surinam's prosperous trade. Sugar

SURINAM EXPORTS AND IMPORTS 1890-1940.

Million guilders



1890-1895-1900-1905-1910-1915-1920-1925-1930-1935-1940

EXPORTS ———
IMPORTS - - - - -

was not able to meet competition of European beet producers, and all agricultural crops suffered when the opening of the Suez Canal brought cheap East Indian goods to the European market.

In the last few years, the boom in bauxite has changed both the character and the direction of trade. Now the exports are largely mineral and not agricultural, and the chief exporter and importer is the United States and not the mother country, Holland. The occupation of the Netherlands by Germany in May, 1940, completed a shift in trade direction which had started years before this tragic event. Now the United States completely dominates the export and import trade of Surinam.

In 1935, bauxite shipments made up 39½ per cent of the total exports, but in 1940 the percentage reached the impressive figure of 87. This tremendous rise in bauxite overshadows agricultural exports completely. In 1935, the combined value of coffee and sugar almost equalled the bauxite figure, but in 1940, these two agricultural products totaled only 7 per cent of the bauxite value. In both exports and imports, the United States has steadily increased her share, especially in exports. The rise of the United States was largely at the expense of the Netherlands. In 1935, imports from the United States amounted to 18.8 per cent, and from Holland 39.4 per cent. By 1940 the situation was more than reversed, and the United States led with 57 per cent, while the Netherlands had only 13 per cent (concentrated in the first four and a third months of the year). The export situation shows an even more striking rise by the United States. In 1935, the percentage of exports to the United States was 46.8, and to the Netherlands, 44, while shipments in 1940 to the United States amounted to 90 per cent, and to the Netherlands only 1.4 per cent.

The type of Surinam's imports may be seen in the classified chart of imports and exports from the United States. Manufactured products, canned foods, oil and gasoline, are the chief imports, while raw materials, particularly bauxite are the chief exports.

The graph of Exports-Imports 1890-1940 shows some inter-

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esting fluctuations. A general increase in trade can be noted until 1915. The subsequent decline may be explained by the failure of cacao and bananas in Surinam, and also due to trade difficulties during World War I. In 1920, the temporary post-war prosperity zoomed the imports to the record of 13,718,026 guilders, but the exports did not respond so violently, and only reached 7,477,512 guilders. In 1928, the record was made for exports, when a total of 11,684,859 guilders were recorded. Trade declined sharply during the world-wide depression of the early thirties. Present war prosperity is now increasing Surinam's trade rapidly because of bauxite which gives to the colony an exaggerated importance at this time.

Surinam — Imports and Exports by Principal Countries*
(Value in Guilders)

Countries	A — Imports				
	1935	1936	1937	1938	1939
Argentina	90,810	120,125	149,297	150,132	194,755
Canada	101,058	76,928	95,468	72,016	86,376
China	51,092	81,931	72,590	104,629	123,940
Germany	235,623	215,744	261,670	294,222	343,424
India	67,197	49,766	79,450	62,752	121,693
Japan	432,024	691,148	608,091	590,921	742,566
Netherlands	2,031,039	2,077,708	2,486,671	2,473,459	2,715,020
Trinidad	195,774	161,597	271,282	239,792	381,303
United Kingdom	634,069	628,481	622,418	495,098	415,321
United States	970,307	172,547	1,541,798	1,756,468	2,363,621
Total (Incl. other countries)	5,158,386	5,612,079	6,689,542	6,761,596	7,882,353
B — Exports					
British Guiana	58,086	36,555	104,168	37,035	127,308
Germany	14,845	37,036	24,840	99,819	46,715
Guadeloupe	8	20,951	147,211	205,321	180,549
Martinique	—	24,135	130,578	144,692	99,425
Netherlands	1,604,318	1,291,009	1,676,406	1,740,435	1,315,396
United Kingdom	60,025	81,139	140,506	207,856	143,117
United States	1,706,396	3,377,246	4,962,505	3,861,263	5,716,765
Total (Incl. other countries)	3,644,779	5,050,870	7,570,161	6,609,139	7,959,210
					8,519,684
					82,444
					—
					36,501
					10,255
					108,007
					278,874
					6,621,370
					7,319,409

* Imports and exports of arms, bullion, and specie excluded.

Surinam — Export of Principal Products (Value in Guilders)

Products	Unit	1935	1936	1937	1938	1939	1940
Rice	1.	285	53,623	413,992	441,898	380,813	115,194
Bananas	kg.	2,254	2,713	759	2,237	1,471	28
Oranges	pieces	5,156	10,612	7,334	8,770	9,611	2,369
Coffee	kg.	898,480	686,947	529,416	465,920	592,786	141,957
Sugar	kg.	482,083	427,060	621,992	546,016	410,353	319,353
Rum	1.	11,350	14,467	28,182	16,246	18,322	17,382
Molasses	1.	19,914	18,783	32,109	34,188	24,986	28,777
Balata	kg.	135,778	142,830	189,750	312,770	437,072	277,389
Timber dressed	M ³	15,989	16,586	33,553	49,796	78,684	18,290
Bauxite	Metric tons	1,439,865	2,923,865	4,904,116	3,826,492	5,293,747	6,353,632
Gold	gr.	557,332	694,205	743,765	839,364	606,882	*

Exports of Principal Products to the U. S.

Coffee	kg.	234,865	433,123	47,013	1,728	139,751	81,457
Balata	kg.	29,141	9,627	—	31,015	148,835	181,660
Bauxite	tons						
of 1000							
kg.		1,439,802	2,923,865	4,904,116	3,826,492	5,293,747	6,353,632
gr.		—	—	—	—	127,222	*
Gold (raw)	gr.						

* Gold figures not released for publication in 1940.

Surinam — Imports from the U. S. (Weight in kilograms. Value in guilders)

Year	Foodstuff and Beverages	Raw or Simply Manufactured Materials		Manufactured Products	
		Weight	Value	Weight	Value
1935	3,283,234	6,395,690	155,367	797,811	398,008
1936	3,362,010	8,578,379	217,962	1,133,967	523,608
1937	3,190,178	9,191,810	259,003	1,204,154	785,485
1938	3,282,736	15,712,566	384,536	1,358,978	914,479
1939	4,409,506	19,226,424	543,424	2,596,430	1,352,741

Exports to the U. S. (Value in Guilders)

Year	Foodstuff and Beverages	Raw or Simply Manufactured Materials		Manufactured Products	
		Weight	Value	Weight	Value
1935	235,180	1,471,087			1,300
1936	433,153	2,943,933			—
1937	47,417	4,914,694			—
1938	2,371	3,858,717			—
1939	141,926	5,447,364			127,222

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